

FLORA OF ASSAM

BY

U. N. KANJILAL, F.L.S.,

Late Extra Deputy Conservator of Forests, Assam.

A. DAS, I.F.S. (Retd.), F.L.S.

P. C. KANJILAL, I.F.S.,

Deputy Conservator of Forests, U.P.

&

R. N. DE, I.F.S.,

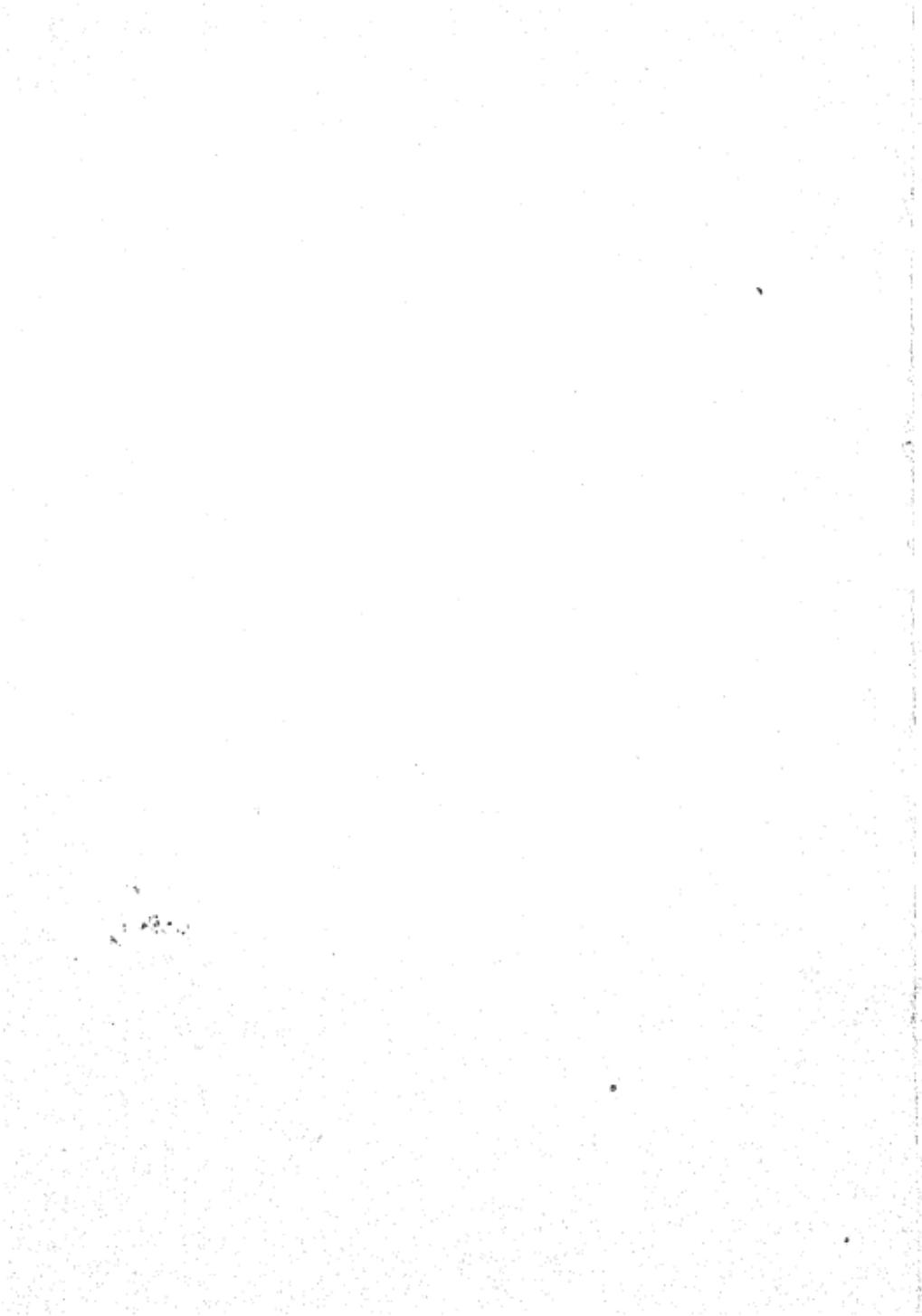
Botanical Forest Officer, Assam.

VOL. III.

CAPRIFOLIACEÆ TO PLANTAGINACEÆ



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FOREWORD.

It is with much pleasure that Volume III of the Flora of Assam is published. This brings us to the end of Gamopetalæ. Steps will be taken to get Volume IV published from the beginning of the next Financial year.

The late Rai Bahadur U. N. Kanjilal made a comprehensive collection of materials for this Volume, but many Forest Officers and others have also made material contribution by sending specimens.

The draft has been revised and edited by Mr. A. Das, I.F.S., now retired, and I as Botanical Officer alone had to go through the proofs and make some additions and alterations. My Botanical Assistant, Babu Banka Bihari Syam, has been of great help to me in correcting the proofs and in other ways and I gladly acknowledge his services. The Volume has run up to over 500 pages, much beyond anticipation, but no pains have been spared to avoid mistakes.

Shillong,

The 15th February, 1939.

R. N. De, I.F.S.

Botanical Forest Officer.

PREFACE

The third Volume of the "Flora of Assam" (*Gamopetalæ*) is now put before the public. The original manuscript of this Volume was completed by me, before my retirement in December 1934. (Ericaceæ—P. C. Kanjilal).

I had to take up this work again by the end of 1937, thoroughly revising and editing my original draft which extended over a period of more than 12 months and involved several references to Kew, Edinburgh, Sibpur and DehraDun and necessitated many personal visits to the herbarium of the Royal Botanic Garden, Calcutta, at my own cost, as in the prolonged period intervening between the original draft and the present publication, considerable changes in nomenclature have taken place, new species have been discovered and described and species have been newly recorded from the region of this "Flora".

I have since described several species (previously not included) which have in certain cases been embodied in small type in this work or included in the addenda with short descriptions. In some instances the original Key to the species or even to the genus had to be revised and altered. Considerable alterations in nomenclature had to be resorted to in view of recent advancement.

It is not realised by critics that the compilation of the "Flora of Assam" could not be comprehensive as the orders of the Government of Assam on the subject were quite distinct. The original idea was therefore to prepare a "Forest Flora" for the region administered by the Forest Department and generally to exclude the herbs unless of great economic importance. I have tried to include on my own initiative whatever additional materials I have been able to obtain in India by personal visit to Sibpur herbarium or by correspondence with DehraDun, Kew and Edinburgh.

An attempt has however been made to bring this Volume, as far as practicable up-to-date, but in the absence of

facilities for ready reference, it is impossible to do justice to a work of this nature. Omission in including a few species of trees, shrubs and many herbs could not however be avoided.

It now remains to acknowledge thanks and indebtedness to all those who have rendered assistance in various ways in the compilation of this Volume.

- (1) Prof. Sir W. W. Smith, Regius Keeper, Royal Botanic Garden, Edinburgh.
- (2) Mr. C. E. C. Fischer, Royal Botanic Gardens, Kew.
- (3) Director, Royal Botanic Gardens, Kew.
- (4) Superintendent, Royal Botanic Garden, Sibpur.
- (5) Forest Botanist, Forest Research Institute, Dehra-Dun.
- (6) Mr. M. V. Narayanswami, Royal Botanic Garden, Sibpur.
- (7) Mr. D. Chatterjee, M.Sc., Royal Botanic Garden, Edinburgh.

I am personally indebted to Mr. R. N. De, B.Sc., I.F.S., for his hearty co-operation in all matters and to my friend Dr. K. P. Biswas, M.A., D.Sc., F.R.S.E., Superintendent, Royal Botanic Garden, Sibpur, for his ungrudging help in all possible directions and also to Babu Banka Bihari Syam, Botanical Assistant, Forest Botanist's Office, Shillong, who is associated with this work from its very inception.

In spite of repeated proof-reading it has not been practicable to avoid printer's mistakes.

A. DAS.

Shillong,
The 21st February, 1939.

INTRODUCTION.

In this Volume 36 families 345 genera and about 1,100 species and the following new species have been included (*vide* the Assam Forest Records Volume I, 1934, and Notes Royal Botanic Garden, Edinburgh. No. XCV, July 1933).

Agapetes Kanjilali Das.

Maba cacharensis Das et. Kanjilal.

Chirita mishmiensis Debbarman ex Biswas.

Strobilanthes furcatus Biswas.

Acrocephalus verbenefolius Watt *Mss. descript.*

Mukherjee.

Scutellaria assamica Mukerjee.

It has been exceedingly difficult for me to keep in touch with the modern nomenclature. Mr. Fischer of Royal Botanic Gardens, Kew, Dr. K. P. Biswas and Mr. Narayanswami of Royal Botanic Garden, Silpur and Mr. D. Chatterjee, M.Sc., now working at the Royal Botanic Garden, Edinburgh, have rendered invaluable assistance in this connection. As far as practicable, the changes in modern nomenclature have been adopted. In some instances the modern name has been inserted after the old name as otherwise it would have necessitated the alteration of a large bulk of the manuscript and in consequence delayed this publication considerably.

It is my intention to discuss concisely the modern adoption in nomenclature in the following pages.

Cephalanthus occidentalis Linn has been introduced in this Volume as synonymous with *C. naucleoides DC* after Brandis, but there is a good deal of controversy on this. Craib (*Flora Siamesis Enumeration Volume II, 1932, p. 8*) considers it rather unnatural to make the East Asiatic *C. naucleoides DC* synonymous with the North American *C. occidentalis Linn*.

The genus *Wendlandia* has been thoroughly revised by Dr. Cowan (*Notes Royal Botanic Garden, Edinburgh, No. LXXX, October, 1932*) it has not been quite practicable to

take advantage of this publication. I have generally followed Brandis and put a concise note on the additional species after Dr. Cowan.

A good deal of difference of opinion exists among botanists at present about the synonymy of the genera *Hedyotis* and *Oldenlandia*. It is considered best to retain the name *Oldenlandia* following the views of a number of systematist. This change could not be made in time in the body of this Volume.

The generic name *Mycetia* Reinw (1826) has been retained for *Adenosacme* Wall (1832) for the sake of priority.

The genera *Webera* Schreb, *Tarennia* Gærtn and *Chomelia* Linn, are synonymous. There is a suggestion from Kew that the generic name *Tarennia* should be substituted for *Webera*.

Mr. D. Chatterjee, Edinburgh, suggests that the name *Chomelia* (Linn) should be retained from the point of view of priority.

- (i) *Chomelia* Linn (1737) (non-*Chomelia* Jacq (1763)).
- (ii) *Webera* (Schreb) (1791)=*Chomelia* Linn.
- (iii) *Tarennia* Gærtn (1788)=*Chomelia* Linn.

Gamble in Flora of Madras has changed to *Chomelia* and Craib has retained *Tarennia* in "Flora Siamensis."

It appears that the new combinations of the species of *Webera* recorded from Assam have not yet been made, the generic name *Webera* and the old specific names have therefore been retained in this Volume.

Crabiodendron W. W. Smith (Record of Botanical Survey of India, Vol. IV, 1911, p. 276). C. Mannii Smith and C. Henryi Smith were described in Notes Royal Botanic Garden, Edinburgh, 1912, pp. 158 & 159 from Jowai and Yunnan respectively on very imperfect materials. Dr. Bor's Naga Hills specimens (Nos. 6271 and 2828) has now definitely proved that they are the same plant and the name C. Henryi Smith should be retained.

Mr. Chatterjee, Royal Botanic Garden, Edinburgh, has made new combinations as given below for *Sideroxylon* which name however has been retained in this work.

Sideroxylon Hookeri Clarke=*Planchonella Hookeri*
(*Clarke*)

S. *grandifolium* *Wall*=*P. grandifolia* (*Wall*) Chatterjee
Comb. Nov. MSS.

S. *assamicum* *Clarke*=*P. assamica* (*Clarke*) Chatterjee
Comb. Nov. MSS.

Parameria pedunculosa Benth should now be named *P. glandulifera Benth.* Mez in *Pflanzenreich* calls *Embelia Nagushia Don*, *E. undulata* as he identifies *E. Nagushia Don* with *E. vestita Roxb.* In this work Brandis has been followed.

A considerable discussion has been raised in *Bot. Mag.* (8976) and the name *Wattakaka volubilis* (*Linn*) *Stapf.* has been restored as a new combination by *Stapf.* for *Dregea volubilis Linn.*

Crawfordia (Gentianaceæ) has been included under *Gentiana* by Marquand. *Limnantheum cristatum Griseb* is now known as *Nymphoides cristata* (*Griseb*) *O. Ktze.*

The generic name *Trichospermum* *Don* has been introduced by Dr. O. Kuntze for *Æschynanthus Jack* (Revision of Gen. Plant. pt. II, p. 475). After necessary investigation the conclusion arrived at is that the name *Æschynanthus* *Jack* is very well established, valid and universally accepted and should therefore be retained.

[*Vide* (a) D. C., Monograph Phanerogam. V (1883). 18, (b) Hooker, F. B. I., Vol. IV. (1884) 377, (c) Ridley, Flora of Malay Peninsula, Vol. II (1923), 496 (d) Handel Mazete, Symbolæ sinicæ, Vol. II (1936) 884, (e) Smith, Record Bot. Survey of India (1913) 404, (f) Anthony Notes, Royal Botanic Garden, Edin. (1934) 191, 192. (g) Fischer, Kew Bulletin (1934) 320, 321.]

The name *Haplophragma* *P. Dop.* has been introduced for the genus *Heterophragma* DC. as the correct name.

Dædalacanthus Anders has been changed to *Eranthemum* *Linn.* and *Eranthemum* *Linn.* of C. B. Clarke (F.B.I.) is now known as *Pseuderanthemum* Radlkf. Genus *Ebermaiera* Nees has been changed to *Staurogyne* *Wall* and *Asystasia* to *Mackaya*.

(x)

The following species has appeared in the body in their old nomenclature which could not be corrected in time.

MODERN NAME	NAME USED IN THIS VOLUME
Premna corymbosa (Burm. f.) <i>Retz. et Willd.</i>	Premna longifolia Roxb.
Clerodendron indicum (Linn.) <i>O. Ktze.</i>	C. Siphonanthus Br.
C. glandulosa Colebr ex Wall.	C. Colebrookiana Wall.
Sphenodesma involucrata (Presl.) <i>Robinson.</i>	S. unguiculata Schau.

Numerous specific names have undergone changes also.

Herbs, which have been collected in this herbarium, have been generally described and included in this Volume.

Shillong,
The 22nd February, 1939.

A. Das.

FLORA OF ASSAM

GAMOPETALÆ.

FAM. 70. CAPRIFOLIACEÆ.

Shrubs or small trees erect or scandent, rarely herbs, often with broad pith. *Leaves* opposite, rarely alternate, simple, lobed or imparipinnate; stipules usually absent. *Flowers* hermaphrodite, actinomorphic or zygomorphic, in cymes or panicles. *Calyx-tube* adnate to the ovary; limb usually 5-fid, imbricate. *Corolla* epigynous, funnel-shaped, tubular or rotate; lobes usually 5, imbricate, sometimes bi-labiate. *Stamens* usually 5, epipetalous, alternating with the lobes; filaments filiform or subulate; anthers 2-celled, versatile, dehiscing longitudinally. *Ovary* inferior, 2-8 celled (rarely 1); style terminal, elongating; stigma usually capitate; ovules anatropous, 1-8, pendulous from the inner angle or axile. *Fruit* a drupe with 1-8 cartilaginous pyrene or a many seeded berry, rarely capsular or dry. *Seeds* with copious fleshy albumen; embryo minute.

I. Corolla actinomorphic :—

Fruit 1 seeded :—

Leaves pinnate. 1. **Sambucus.**

Leaves simple, usually toothed. 2. **Viburnum.**

II. Corolla zygomorphic :—

Fruit many seeded :—

Stem solid. Ovary 2-3 celled. 3. **Lonicera.**

Stem hollow. Ovary 5-8 celled. 4. **Leycesteria.**

1. **SAMBUCUS** Linn.

Sambucus javanica Blume. Vern. *Hoklati*, Ass.

A shrub or small tree with large pith. *Leaves* imparipinnate; stipules small. *Leaflets* 2-6 by 1·2 to 2 in., oblong, elliptic, oblanceolate, serrate, acuminate, puberulous;

petiole 16·5 in. long. *Flowers* white, small, in terminal bracteate puberulous or almost villous corymbs; pedicels jointed; bracteoles minute. *Calyx* 3-5 toothed. *Corolla* broadly campanulate, white or pinkish, 3-5 cleft. *Stamens* 5. *Ovary* 3-5 celled, with one pendulous ovule in each cell. *Drupe* globose, black, crowned by the calyx teeth; endocarp cartilaginous.

N. E. F. TRACT, LAKHIMPUR, SIBSAGAR, KAMRUP, NAGA HILLS, MANIPUR and KHASI HILLS (up to 4,000 ft.).

Roots used medicinally. Leaves used as vegetable.

Fls. 5-8. Fr. 9-12.

2. VIBURNUM Linn.

Shrubs or small trees. *Leaves* opposite when bruised, with generally disagreeable smell. *Stipules* inconspicuous or O. *Flowers* pentamerous, in terminal or subterminal corymbose or panicled cymes (all fertile in Indian species). *Calyx tube* turbinate or cylindric; limb 5-fid, persistent. *Corolla* rotate, tubular or campanulate, 5 lobed. *Stamens* 5. *Ovary* 1-3 celled with solitary ovule in each cell; style short; stigma 3 lobed. *Fruit* a dry or fleshy drupe, usually 1 seeded. *Seeds* oblong, compressed or concave by the endocarp projecting into the cavity; albumen uniform or ruminant.

Inflorescence umbellate :—

Drupe 1-celled. Seeds flat :—

Leaves dentate, parallel nerved, softly hairy beneath.

1. *V. corylifolium*.

Leaves remotely toothed or serrate, lowest pair of nerves basal, stellately pubescent beneath (distinctly fetid). . .

2. *V. foetidum*.

Leaves crenate serrate; nerves arcuate, glabrous beneath.

3. *V. Colebrookianum*.

Inflorescence pyramidal, thyrsiform :—

Leaves entire, glabrous, with a glaucous bloom when bruised.

4. *V. cylindricum*.

Inflorescence usually 3-fid cymes, arranged in terminal thyrsus. Seeds concave :—

Flowers appearing with or after the leaves :—

Albumen ruminant :—

Drupe dry, hard, blue.

5. *V. atro-cyanum*.

Albumen uniform :—

Corolla rotate :—

Fruit succulent, spuriously 2-celled :—		
Lateral nerves subparallel, remote, glandular. Drupe brownish red.	6.	<i>V. odoratissimum.</i>
Lateral nerves close, oblique. Drupe bright red.	7.	<i>V. Simonsii.</i>
Corolla tubular :—		
Fruit succulent, spuriously 3-celled :—		
Leaves pubescent on the nerves beneath. Drupe red.	8.	<i>V. erubescens.</i>
Inflorescence terminal corymb :—		
Flowers appearing before the leaves :—		
Leaves serrate, parallel nerved, with tufts of hairs at the axils of nerves, distinctly foetid.	9.	<i>V. foetens.</i>

1. Viburnum corylifolium Hk. f. & T. Vern. Sohlang, Dieng-soh-lang-sou, So-lang-ksew, Khasi.

A straggling shrub up to 12ft. *Branchlets* and inflorescence rufous-hirsute. *Leaves* 1·3-3·7 by 0·9-2·7 in., ovate or elliptic, acute, dentate, membranous, underside densely clothed with soft hairs, subcordate or rounded; lateral nerves 5-8 on either half, subparallel; petiole 0·3-0·5 in. *Flowers* 0·2 in. across, sub-orbicular or sessile. *Calyx* stellate-hairy outside; segments obscure. *Corolla* white, rotate, hairy outside, glaucous within, 5 lobed; lobes sub-acute or orbicular. *Stamens* exserted; anthers dorsifixated. *Ovary* 1-celled; style narrowed from a broad base; stigma 3 lobed. *Drupe* globular, bright red, 0·25 in. long. *Seed* flat, shallowly grooved; albumen uniform.

KHASI HILLS, 5-6000 ft.

Fruit edible.

Fls. 3-5. Fruit. 7-9.

2. Viburnum foetidum Wall. Vern. Dieng-soh-lang, So-lang-ksew, Khasi.

A shrub upto 10 ft. *Bark* greyish. *Branchlets*, petioles and inflorescence clothed with stellate hairs. *Leaves* 1·3 by 0·5-1·5 in., rhomboidal or elliptic-lanceolate, mucronate, coriaceous, glabrescent above, pubescent on nerves beneath; lateral nerves 3-4 on either half, lowest pair basal; base cuneate; petiole 0·2-0·3 in. long. *Flowers* small in compound pedunculate umbels; bracts numerous. *Calyx tube* glabrous; teeth minute, triangular. *Corolla* short, white. *Drupe*

scarlet red, acid. Seeds dorsally 2-grooved, ventrally 3-grooved; albumen uniform.

KHASI HILLS upto 6,000 ft.

Flrs. 6-7. Fr. 10-11.

3. Viburnum Colebrookianum Wall. Vern. *Giuporang-asing*, Miri; *Kumbad-pyrleng-doh*, Khasi; *Jongmathi*, Kuki; *Sangrima-buphang*, Mech; *Mezenga*, Ass. *Pani-phuti*, (Kam.); *Bolmichek*, Garo.

A large shrub; branches horizontal and spreading; young parts stellate, pubescent. Leaves drooping, 3·5-7 by 1·5-3·3 in., elliptic-oblong, shortly acuminate, crenate-serrate, thinly chartaceous, almost glabrous; lateral nerves 8-9 on either half, arcuate, almost glabrous; petiole 4-9 in. long. Flowers white, in erect axillary compound pedunculate umbels. Bracts minute; bracteoles wanting. Calyx-tubes glabrous; teeth minute. Corolla short, rotate. Drupe orbicular, red. Seed obscurely grooved; albumen uniform.

Common throughout ASSAM ascending up to 5,000 ft. (KHASI HILLS).

Pounded leaves are used to cure old sores.

Flrs. 2-4. Fr. 6.

4. Viburnum cylindricum Ham. Syn. *V. coriacium* Bl. Vern. *Soh-ja-hynlan*, *Dieng-soh-ratlan*, *Dieng-soh-law*, Khasi; *Pithe-chor*, Nep.

A shrub or small tree. Bark greyish, fibrous; blaze whitish, turning dark-brown. Leaves 3·5-8·5 by 1·2-2·5 in., usually entire, oblong, lanceolate, long acuminate, coriaceous, glabrous with tufts of grey hairs at the axils of nerves; if the leaves are bruised they appear to be covered with glaucous bloom; lateral nerves 4-6 on either half, arcuate; base truncate or cuneate; petiole 5-1·5 in. long. Flowers sweet-scented, bluish white, in peduncled umbellate cymes. Calyx tube glabrous or puberulous; limb inconspicuous. Corolla tubular; lobes short, erect, puberulous. Anthers purplish, versatile. Drupe 2 in., black, succulent. Seeds dorsally 2 grooved; albumen uniform.

GOALPARA, K. & J. HILLS up to 5,000 ft.
An oil is extracted from the seeds in Nepal (Brandis).

Flrs. 7-8. Fr. 9-10.

5. Viburnum atro-cyanescens C. B. Clarke.

An evergreen shrub. *Leaves* 1·5-3 by 8-1·5 in., elliptic-lanceolate or narrow oblong, acute, entire, glabrous, shining; lateral nerves 7-9 on either half, impressed above; midrib impressed above, prominent beneath; base acute or cuneate; petiole 3-8 in. *Drupe* ellipsoid, blue, hard, dry. *Seed* concave; albumen ruminant; the intruded testa with red resinous glands.

MANIPUR (Watt. 5978) 6-10,000 ft.; MISHMI HILLS.

Flrs. 4. Fr. 1.

6. Viburnum odoratissimum Ker. Vern. Dieng-soh-lang-sniang, Synt.

A shrub or a small tree. *Leaves* 3-4·5 by 1-1·5 in., elliptic, sub-entire or sparingly dentate, shortly acuminate, coriaceous; lateral nerves 5-7 on either side, remote and glandular; base cuneate; petiole 5-8 in. *Panicle* glabrous, appearing with or after the leaves. *Flowers* white or whitish yellow, fragrant. *Bracts* and bracteoles caducous, stellately hairy. *Calyx* wide with 5 short triangular teeth. *Corolla* campanulate, glabrous; lobes 16 in., elliptic. *Drupe* 25-7 in. long, succulent, terete, oblong, dark-red or reddish brown, 1-seeded. *Seed* concave, transverse section half moon-shaped; albumen uniform.

Jowai and Mawsmai (K. & J. Hills).

Flrs. 6-7. Fr. 8-9.

7. Viburnum Simonsii Hk. f. & T. Vern. Sohlang-eit-ksew, Khasi.

A shrub or a small tree up to 40 ft. high. *Bark* thin, greyish outside and brownish mottled inside. *Leaves* 2·5-5·5 by 8-2·8 in., elliptic, distantly cuspidate, dentate, short-acuminate, coriaceous, glabrous; lateral nerves 5-8, oblique, closer than *V. odoratissimum*, with tufts of greyish hairs at

the axils of nerves beneath; base rhomboid or cuneate; petiole ·4·8 in. long. *Inflorescence* stellate—pubescent. *Flowers* usually white, tinged with red, sweet scented. *Corolla* short, campanulate. *Drupe* bright red, ·25 in. long.

KHASI & JAINTIA HILLS (4-6,000 ft.).

Flrs. 2-6. Fr. 8-10.

8. Viburnum erubescens Wall.

A small deciduous tree; young parts pubescent. *Leaves* 2·5 by 1·2·3 in., ovate, elliptic or sometimes suborbicular, acute or acuminate, upper part serrate, subcoriaceous, glabrous above, pubescent on the nerves beneath; lateral nerves 4-6 on either half; base rounded; petiole ·4·9 in. long. *Inflorescence* usually pendulous at the ends of short branches. *Flowers* white or pale pinkish. *Calyx* teeth ovate. *Corolla* tubular, ·3·6 in. long. *Drupe* ·25·4 in. long, red. *Seed* deeply grooved.

MANIPUR (Watt. No. 6560).

Flrs. 3-5. Fr. 8-10.

9. Viburnum fœtens Dcne.

A shrub; young shoots emitting a foetid smell when bruised. *Leaves* 1·3-2 by ·5-9 in., elliptic, acute, cuneate, serrulate, membranous, glabrous, pubescent on the nerves beneath; lateral nerves 5-7 on either side, distantly parallel, with distinct tufts of hairs at the axils of the nerves; base acute; petiole ·2·4 in. *Inflorescence* pubescent or tomentose. *Flowers* appearing before the leaves, white, pinkish or rosy in lax terminal corymbs. *Bracts* deciduous; bracteoles scarious. *Calyx* ·1 in. long; teeth minute, irregular. *Corolla* tubular; lobes spreading, ·5·7 in. long. *Stamens* 2, inserted near the top of the corolla tube, 3 lower down. *Drupe* ellipsoid, red. *Seed* deeply concave; albumen uniform; endocarp T-shaped.

KHASI HILLS up to 6,000 ft.

The fruit is said to be edible.

Flrs. 7. Fr. 9.

3. LONICERA Linn.

Shrubs, erect, scandent or climbing. *Bark* usually peeling off in thin shreds or papery flakes. *Leaves* opposite, entire, rarely lobed, short petioled or sessile. *Flowers* pentamerous, usually in pairs in axillary or sub-terminal peduncles or sessile in leaf axils, often connate by their ovaries, subtended by a bract and 2 bracteoles, the latter distinct or connate or sometimes absent; stipules usually absent. *Calyx tube* ovoid; limb short, 5 toothed or almost truncate, deciduous or persistent. *Corolla* tubular or funnel-shaped, often gibbous at base, limb oblique or bilabiate, 5 toothed, the upper lip 4 toothed, the lower reflexed, entire. *Stamens* 5, inserted on the corolla tube, usually near the mouth; anthers usually exserted. *Ovary* 2-3 celled; style filiform; stigma capitate; ovules many in each cell in double rows. *Fruit* a fleshy berry, distinct or connate in pairs, few seeded; albumen fleshy.

Shrubs, climbing :—

Corolla bilabiate :—

Ovaries free :—

Corolla glabrous :—

Flowers 3-5 in. Leaves fleshy. 1. *L. Braceana*.

Corolla hairy :—

Flowers up to 2·5 in. Leaves coriaceous. 2. *L. macrantha*.

Flowers up to 1 in. Leaves thinly membranous. 3. *L. ovata*.

Shrubs, erect :—

Corolla gibbous :—

Ovaries confluent :—

Flowers nearly sessile, ·25 in. 4. *L. ligustrina*.

1. Lonicera Braceana Hemsl.

A straggling shrub or climbing. *Leaves* 4-6 by 1·5-2·5 in., oblong-lanceolate or elliptic lanceolate, pointedly acuminate, entire, coriaceous, flesh coloured, glabrous, shining above, pale beneath; lateral nerves 6-8 on either half, arched and anastomosing, tertiary nerves obscure; petiole ·6-1·4 in. long, channelled; stipules represented by a transverse membrane at the base of the petiole. *Flowers* free, in pairs on solitary in axillary peduncle, (apparently) reddish outside, yellow and orange inside, 3-5 in. long. *Calyx*

5-partite. *Corolla* glabrous outside, hairy within with short stiff hairs, bilabiate, upper lip short, lower lip 1·1·25 in. long. *Stamens* 5, equal; anthers versatile; filaments and style hairy with stiff hairs. *Style* longer than the stamens; stigma capitate. *Ovaries* free, sessile, supported by bracts similar to calyx. *Berry* 1 by ·7 in., crowned with calyx teeth.

KHASI HILLS—Umwai, Mawmlloo (C. B. Clarke), Bishop's Falls, Jowai (Mann), up to 4,000 ft.

I have examined all the original sheets of G. Mann and C. B. Clarke and compared them with the Burma collection of L. Braceana Hemsl. I do not find any justification of calling the Khasi Hill plant *L. magnifica* *Brace* or *L. Regia* as proposed by C. B. Clarke. I consider all the Khasi Hill sheets are *L. Braceana* Hemsl.

Flrs. 4-7. Fr. 10-12.

2. *Lonicera macrantha* DC. Vern. *Mli-rong-khong*, *Jermei-ren*, Kh.

A climbing shrub; stem woody, wood cream coloured. *Bark* thin, rough, exfoliating. *Branchlets* and inflorescence densely clothed with long soft hairs. *Leaves* 1·3-4 by ·6-2 in., oblong or oblong-lanceolate, coriaceous, ciliate, more or less rugose above and villous beneath; lateral nerves 5-7 on either half, tertiary nerves reticulate; base cordate; petiole ·1-·2 in. long. *Flowers* pale white, turning pale yellow, 1·5-2·5 in. long, often arranged in dense terminal panicles; bracts linear; bracteoles small. *Calyx teeth* linear, with long soft hairs. *Corolla* glabrous outside, bilabiate. *Stamens* 5; anthers versatile. *Style* purplish, filiform; stigma capitate. *Ovaries* free. *Fruit* geminate, axillary.

KHASI HILLS up to 6,500 ft.

Flrs. 4-5. Fr. 8-9.

3. *Lonicera ovata* Ham.

A climbing shrub with cinnamon coloured smooth branches. *Leaves* 1-2 by ·6-1·2 in., ovate, acute or rounded at the apex, thinly membranous, glabrous; lateral nerves about 4 on either half; tertiary nerves very finely reticulate, almost obscure; base rounded or subcordate; petiole slender, ·2-·3 in. long. *Flowers* about 1 in. long, in pairs, sessile,

yellowish white, slightly scented on slender pubescent axillary peduncles, bracts ovate, lanceolate; bracteoles minute. *Calyx-tube* glabrous or ciliate. *Corolla* bilabiate; tube slender; lobes spreading, 2·4 in. long, glabrous outside, the upper lip cut barely to the half into 4 lobes, the lower linear, 2 in. long. *Stamens* 5. *Ovaries* free; style hairy, filiform. *Fruit* a fleshy berry.

ASSAM (Brandis).

Flrs. 5-6.

4. *Lonicera ligustrina* Wall.

An erect shrub or small bushy undershrub; stem twisted. *Branchlets* pubescent. *Bark* light brown, papery. *Leaves* 4-2 by 2·7 in., ovate to lanceolate, acute or acuminate, entire, nearly glabrous, shining above; lateral nerves inconspicuous, midrib hairy beneath; base nearly rounded; petiole 0·5-2 in. long. *Flowers* greenish or creamy-white, sessile; bracts linear; bracteoles enlarged in fruit. *Peduncle* very short. *Calyx* limb tubular with a reflexed ring below the lobes; margin irregular. *Corolla* shortly elongate and gibbous at base, 5 lobed; lobes with scattered bristles. *Style* 3-fid at the extremity. *Ovaries* confluent. *Fruit* of 2 connate carpels, ruby coloured, juicy, supported by boat-shaped membranous bracteoles.

KHASI HILLS up to 6,500 ft.

Flrs. 4-6. Fr. 9-10.

4. LEYCESTERIA Wall.

Shrubs; branches herbaceous; young branches often fistular. *Leaves* distichous, sometimes stipulate. *Flowers* pentamerous, more or less zygomorphic or actinomorphic. *Inflorescence* spicate or pseudo-verticillate. *Calyx-segments* persistent, often unequal. *Corolla* funnel-shaped. *Stamens* 5, inserted on the throat of the corolla. *Ovary* 5-8 celled; style usually slender; stigma capitate; ovules numerous. *Berry* many seeded. *Seeds* minute; testa crustaceous.

Corolla zygomorphic. 1. *L. formosa*.

Corolla actinomorphic. 2. *L. crocothrysos*.

1. *Leycesteria formosa* Wall.

A bushy shrub or undershrub with grey stem and deep green fistular branches usually from near the base. *Leaves* opposite, 2-5 by 1-3 in., stipulate, ovate or ovate lanceolate, long acuminate, entire or irregularly undulate, membranous, shining, glabrous or scabrous above, puberulous and pale beneath; lateral nerves 4-6 on either half, arcuate; base truncate or rounded; petiole 2-1 in. long, connate at the base. *Flowers* glandular-puberulous, more or less zygomorphic, 1 in. long, purplish, in bracteate whorls forming axillary or terminal drooping spikes; bracts leaf-like, sessile, greenish purple, generally connate at the base, ciliate; bracteoles variable, smaller. *Calyx* 5 lobed, unequal, persistent. *Corolla* funnel-shaped, irregularly 5 lobed. *Stamens* 5. inserted on the throat of the corolla, equalling the lobes. *Ovary* 5-celled; style slender; stigma capitate; ovules many, biserrate in each cell. *Berry* 5 in. long, subglobose, dark purple, glandular hairy, tipped with calyx limb. *Seed* minute, many.

KHASI HILLS (7737). Rare.

Flrs. 6-7. Fr. 7-8.

2. *Leycesteria crocothrysos* Airy Shaw.

A small lax shrub, young branches fistular, terete. *Leaves* 5 by 2 in., ovate or oblong, rarely ovate lanceolate, acuminate, subremotely dentate; teeth glandular-apiculate; stipules reniform or suborbicular. *Inflorescence* terminal, villous-pubescent. *Flowers* bright orange, sessile in pseudoverticillate receptacle, ovoid. *Calyx* shortly connate, shortly and sparsely pilose outside, glabrous inside. *Corolla* actinomorphic. *Stigma* large, capitate. *Ovary* 5 locular, many ovuled. *Fruit* not seen.

K. Ward (8150). Delei Valley, ASSAM. (Kew Bulletin No. 4, 1932. p. 170-171).

FAM. 71. RUBIACEÆ.

Trees, shrubs or herbs, erect, prostrate or scandent, sometimes thorny. *Leaves* simple, opposite or whorled with inter or intrapetiolar stipules, free or adnate to the petiole or forming a sheath round the stem. *Inflorescence* various, typically cymose. *Flowers* usually hermaphrodite, rarely unisexual, usually regular, epigynous, 4-5 merous. *Calyx-tube* adnate to the ovary; limb various (4-5), (sometimes one sepal longer than the rest and coloured). *Corolla* (4-5) gamopetalous. *Aestivation* valvate, contorted or imbricate. *Stamens* usually as many as the lobes of the corolla, inserted on the tube or mouth, alternating with the corolla lobes; anthers 2 celled. *Disk* epigynous, usually annular or cushion-shaped. *Ovary* inferior, usually 2-10 celled (rarely 1-celled); style simple or cleft; stigma various, one or more in each cell. *Fruit* various. *Seeds* various, usually with fleshy or horny albumen; embryo straight or curved; cotyledons usually flat, sometimes semiterete; radicle superior or inferior.

(In many of the genera the wood fibres have bordered pits—*Brandis*).

I. Ovules numerous in each cell (rarely few) fruit 2-celled :—

Flowers in dense globose heads.
Corolla funnel-shaped; stigma simple :—

Erect trees or shrubs :—

Corolla lobes valvate; ovary free,
fruit often capsular.

Corolla lobes imbricate :—
Calyx-tube joined in a
mass :—

Ovary 2-celled; ovules
numerous.

Ovary 2-celled; ovules 1 in
each cell.

Calyx-tube free :—
Seeds not winged.

1. *Mitragyna*.

2. *Sarcocephalus*.

3. *Cephalanthus*.

4. *Anthocephalus*.

- Seeds winged :—
- Stigma globose, ovoid. Heads of flowers large, few together (1 or 2).
 - Stigma clavate. Heads of flowers small, numerous.
- Climbing shrubs. Peduncles hooked.
- II. Ovules numerous; flowers not in dense globose heads. Capsule 2-celled; seeds winged :—
- Corolla lobes valvate; bracts foliaceous, persistent :—
 - Style 2-fid, epiphytic shrubs.
 - Style entire, usually trees.
 - Corolla lobes valvate; lobes fringed.
 - Corolla lobes imbricate; style 2-fid.
- III. Ovules numerous; flowers in trichotomous panicles. Capsule 2-celled; seeds angular (not winged) :—
- Corolla lobes twisted in bud.
- IV. Ovules numerous; flowers not in dense globose heads. Capsule 2 or 4-celled or cocci 2-4 :—
- Corolla lobes valvate :—
 - Leaves entire :—
 - Stamens 4 :—
 - No interposed teeth between calyx teeth.
 - With broad intervening sinuses between the calyx teeth.
 - Stamens 5 :—
 - Capsule small, subglobose.
 - Capsule compressed, broadly didymous, obcordate.
 - Leaves dentate :—
 - Stamens 2.
- V. Ovules numerous. Fruit a berry or drupaceous. Seeds minute. Corolla valvate :—
- Inflorescence terminal :—
 - Calyx with one lobe usually enlarged and coloured.
 - Inflorescence axillary :—
 - Calyx teeth 4-6, persistent; stamens 4-6.
 - Calyx teeth 5, persistent; stamens 5.
- VI. Ovules few or numerous in each cell (except Webera). Fruit berry. Seeds large :—
- 5. *Nauclea*.
 - 6. *Adina*.
 - 7. *Uncaria*.
 - 8. *Hymenopogon*.
 - 9. *Hymenodictyon*.
 - 10. *Cinchona*.
 - 11. *Luculia*.
 - 12. *Wendlandia*.
 - 13. *Hedyotis*.
 - 14. *Anotis*.
 - 15. *Polyura*.
 - 16. *Ophiorrhiza*.
 - 17. *Silvianthus*.
 - 18. *Mussaenda*.
 - 19. *Mycteria*.
 - 20. *Myrioneuron*.

- Inflorescence terminal :—
- Flowers 5 merous :—
- Bisexual :—
- Stigma fusiform.
- Diœcious :—
- Style-arms 2.
- Inflorescence axillary or supra-axillary :—
- Stigma fusiform :—
 - Corolla lobes 5 or more; ovary 1-celled.
 - Corolla lobes 5; ovary 2-celled. - Style bifid; ovules 2-10 in each cell.
 - Style bifid; ovules 2 or 3 in each cell.
- VII. Ovules solitary in each cell. Corolla lobes valvate. Stamens inserted on the mouth of the corolla :—
- Fruit of 2 cocci.
- Seeds compressed dorsally :—
- Herbs; fruit very small.
 - Drupe with 2-many free or united pyrenes. Seeds various :—
 - Corolla lobes valvate :—
 - Ovary 2-celled; stigma large, usually lobed.
 - Ovary 5-celled; stigma 4-5 lobed.

VIII. Ovules solitary in each cell. Corolla lobes twisted in the bud; radicle superior :—

Inflorescence terminal, panicled or corymbose :—

 - Leaves and bracts coriaceous; style less than twice the length of corolla tube.
 - Leaves membranous, bracts membranous, lower sheathing; style twice the length of corolla tube.

Inflorescence axillary, fascicled or solitary.

IX. Ovules solitary in each cell. Corolla lobes valvate; radicle inferior. Fruit capsular or of 2 cocci or pyrenes; leaves fetid when bruised :—

 - Capsule 5 valved at the base; style-arms 5; erect shrubs.

21. *Webera*.

22. *Brachytome*.

23. *Gardenia*.

24. *Randia*.

25. *Hyptianthera*.

26. *Tricalysia*.

27. *Knoxia*.

28. *Canthium*.

29. *Vangueria*.

30. *Ixora*.

31. *Pavetta*.

32. *Coffea*.

33. *Leptodermis*.

- Pyrenes (2) flat, orbicular or elliptic; styles 2 capillary; twin-ing shrub.
- X. Ovules solitary. Corolla lobes valvate; radicle inferior; ovules amphitropous. Fruit drupaceous or baccate :—
- Calyx tube cohering; limb truncate :—
- Flower heads dense, many flowered.
- Calyx tube free :—
- Calyx limb 4-5 fid. Corolla throat villous. Fruit a Drupe. . .
- Calyx truncate. Corolla throat glabrous. Fruit a Berry. . .
- XI. Ovules solitary. Corolla lobes valvate; radicle inferior; ovules basal erect. Fruit drupaceous or baccate :—
- Flowers in terminal trichotomous cymes :—
- Ovary 2-celled :—
- Corolla tube short, straight.
- Calyx 4-5 toothed.
- Corolla tube slender, curved.
- Calyx 5 toothed.
- Corolla bell or funnel shaped; cymes often few flowered; calyx limb dilated, unequal, 4 toothed.
- Flowers in axillary clusters or short cymes :—
- Ovary 4-9 celled. Corolla bell or funnel-shaped. Calyx 3-6 toothed.
- XII. Ovules solitary in each cell. Corolla valvate; ovules amphitropous. Ovary usually 2-celled :—
- Fruit of 2 separate cocci both or one dehiscing ventrally.
- XIII. Ovules solitary in each cell. Corolla lobes valvate in bud. Ovary 2 celled; ovules basal. Fruit indehiscent, coria-ceous or fleshy. Seeds peltate. Leaves whorled, exstipulate :—
- Corolla 5 merous.
- Corolla 4 merous.
34. Pæderia.
35. Morinda.
36. Damnacanthus.
37. Prismatomeris.
38. Psychotria.
39. Chasalia.
40. Saproisma.
41. Lasianthus.
42. Borreria.
43. Rubia.
44. Galium.

1. MITRAGYNA Korth.

Shrubs or trees. *Leaves* petiolate, usually with transverse parallel nerves; stipules large, caducous. *Flowers* pentamerous, yellowish, in globose axillary or terminal solitary or panicled pedunculate heads, each surrounded by foliaceous bracts; often they are petiolate and subpersistent. *Calyx tube* short, obconic, truncate or 5 toothed. *Corolla* funnel-shaped; tube long; throat glabrous or pilose; lobes 5, valvate. *Stamens* 5 on the throat of the corolla; filaments short, filiform; anthers oblong, apiculate. *Ovary* 2-celled; style filiform; stigma mitriform; ovules many, imbricate on pendulous placenta. *Fruit* a globose head of 2 dehiscent cocci. *Seeds* campanulate, suborbicular; testa winged; albumen fleshy; cotyledons flattened; radicle superior.

Corolla lobe glabrous without :—

Calyx limb short but distinct. *Flower heads* single or in cymes of three :—

Bracteoles hairy at apex. 1. *M. parvifolia*.

Calyx limb O. *Flower heads* in ample trichotomous cymes. *Bracteoles* glabrous. 2. *M. diversifolia*.

1. **Mitragyna parvifolia Korth.** (*Stephegyne parvifolia* Korth).

A large deciduous tree; trunk irregularly shaped, often buttressed. *Bark* light brownish or greenish-grey, smooth with shallow depressions left by exfoliation, light pinkish white inside, soon turning to deep brown, very fibrous. *Leaves* very variable in size and shape, elliptic-orbicular, oblong, ovate or obovate, bluntly acuminate, coriaceous, glabrous above, thickly pubescent beneath; lateral nerves 6-8 pairs, oblique; base cuneate to subcordate; stipules keeled, obovate, membranous, covering the buds and falling in thin expansion. *Flowers* light white or yellow in globose pedunculate heads about 1 in. in diameter. *Heads* solitary, terminal or in cymes of 3; bracteoles spatulate, minute. *Calyx-tube* short, truncate or minutely 5 toothed. *Corolla* narrowly funnel-shaped or trumpet-shaped; lobes 5, valvate. *Stamens* 5, inserted on the throat of the corolla tube; anthers apiculate; filaments short. *Ovary* 2-celled; style filiform,

much exserted, mitriform; base hollow. *Capsules* in globose head of 100-150, dry, 12 in. long, splitting into 2 dehiscent cocci. *Seeds* many, winged, minute.

Fulbari—GARO HILLS.

Wood light pinkish brown, close, fine grained, and generally harder than that of *Adina cordifolia*. Uses similar.

Flrs. 6-7. Fr. 12-2.

2. *Mitragyna diversifolia* *Haviland*. Modern name *M. rotundifolia* (*Roxb.*) *O. Ktze.* Vern. *Sealphusri*, Nep.; *Tini*, Ass.; *Itum-po-arong*, Mik.; *Bonstip*, *Bonsodeb-phang*, Kach.; *Tong-khop-nopang-thing*, Kuki; *Bon-sodeb-phang*, Kach.; *Tong-khop-nopang-thing*, Kuki; *Bon-champa* or *Lawa*, Sylh.; *Thinglung*, Lushai; *Choibong*, *Mankhp-thing*, Tipp.; *Lotumpoh-arong*, Mik.

A deciduous middle-sized tree. *Leaves* 3-8 by 1-7 in., orbicular, broadly ovate or elliptic or shortly acuminate, glabrous or finely pubescent; lateral nerves 7-9 on either half, subparallel; base rounded, cordate or attenuate; petiole 5-1.5 in. long; stipules obovate, 5-7 in. long. *Flower-heads* greenish white, often lateral in ample trichotomous cymes with or without foliaceous bracts which are petiolate and persistent; bracteoles glabrous, hirsute along the upper part of the margin. *Calyx* short; limb obscure, hirsute along the margin. *Corolla* 2 in. *Cocci* ribbed. *Seeds* winged at both ends.

NOWGONG (Lumding, Lanka); N. CACHAR HILLS (Haflong); LUSHAI HILLS, CACHAR.

Flrs. 3-7. Fr. 8-2.

2. SARCOCEPHALUS Afzel.

Sarcocephalus cordatus *Miq.* Modern name *Nauclea orientalis* *L* (1762) Vern. *Thing-ka*, Kuki.

A middle-sized deciduous tree. *Bark* dark grey, somewhat rough outside, light dun yellow inside, somewhat soft. *Leaves* 5-12 by 4-8. (Hooker), suborbicular, broadly ovate or elliptic-ovate, obtuse, entire, thinly coriaceous, glabrous, puberulous beneath; lateral nerves 7-8 on either half, subparallel; base rounded, often cordate; petiole 7-1 in. long; stipules ovate, oblong, blunt. *Heads* globose, somewhat

nodding, 1 in. across, solitary, terminally on axillary shoots and axillary at the end pair of leaves. *Flowers* small, yellowish, fragrant, sessile, ebracteolate, more or less free. *Peduncle* 1·1·5 in. long. *Calyx-segments* clavate, minutely hairy. *Corolla* quite glabrous, ·25 in. long; lobes imbricate, obtuse. *Stamens* inserted on the mouth of the corolla tube; anthers sessile, acute. *Ovary* 2-celled; style exserted; stigma fusiform; ovules numerous. *Fruit* ·6-1 in. across, a globose fleshy syncarpium, but hardly cohering. *Seeds* few, ovoid, compressed, minute, not winged; albumen fleshy; embryo rather large.

CACHAR (Bhuban Hill).
Believed to be anthelmintic.

Flrs. 6-7. Fr. 11-12.

3. CEPHALANTHUS Linn.

Cephalanthus occidentalis Linn. Vern. *Thengmi-rokarong*, Mik.; *Panikadam*, Ass.; *Dingla-miksiai*, Synt.; *Kadampuli*, Upper Assam.

An evergreen elegant shrub or small tree; all young parts more or less pubescent or tomentose. *Bark* grey, deeply furrowed, salmon brown and spongy inside, ·5-·7 in. thick, soft, turning deeper brown, almost gregarious in swampy localities. *Leaves* 3-5 by 1-2 in., opposite or in whorls of 3 or 4, elliptic, ovate, ovate-lanceolate, acuminate, entire or undulate, membranous, glabrescent above, more or less pubescent beneath; lateral nerves 10-12 on either half, subparallel; rounded or narrowed at the base; petiole ·2-·8 in. long; stipules acuminate, often gland tipped. *Flowers* white, fragrant, sessile on globose heads of ·5 in. in diameter on 1-2 in. long puberulous peduncles arranged in terminal trichotomous leafy panicles or sometimes solitary in the axils of the uppermost leaves; bracteoles clavate. *Calyx* campanulate, woolly inside; segments usually 4-5, rounded. *Corolla* trumpet-shaped; lobes usually 4-5, imbricate, alternating with black gland dots at the sinus. *Stamens* 4, inserted on the mouth of the corolla; filaments short; anthers bicuspitate at the base usually. *Ovary* glabrous, 2-celled, not confluent; style filiform; stigma clavate; ovules solitary, pendulous.

Fruit compressed of numerous 1-seeded cocci. *Seeds* shortly winged at the apex, arillate; albumen horny.

NOWGONG, CACHAR, UPPER ASSAM, KHASI HILLS.

Flrs. 3-5 or throughout the year.

C. naucleoides DC Prodr. is also found in Assam.—R. N. De.

4. ANTHOCEPHALUS A. Rich.

Anthocephalus Cadamba Miq. Modern name *A. indicus* A. Rich. Vern. *Logchu-arong*, Mik.; *Banthalang*, Lushai; *Donlin*, Kardam, Tipp.; *Roghu*, Ass.; *Mi-bol*, Garo; *Kodom*, Sylhet, Cach.; *Gongdok*, Maupa, *Kalam-phang*, Kach.; *Naranpadum*, Kuki; *Nipang-lulangasing*, Miri; *Dieng-soh-lang-pathi*, Khasi.

A large handsome deciduous tree with very straight cylindric stems and horizontal branches, more or less whorled. *Leaves* 5-10 by 2-4 in., ovate, elliptic-oblong, coriaceous, shining or glabrous above, pubescent beneath, acuminate; lateral nerves 8-10; base cuneate or obtuse; petiole 5-1.5 in.; stipules caducous, linear-lanceolate. *Flowers* pentamerous, small, orange coloured, united by the confluent calyx tube, in dense terminal solitary peduncled globose heads; bracts stipular; bracteoles wanting. *Calyx* segments 5, imbricate, oblanceolate, persistent. *Corolla* funnel-shaped; lobes 5, imbricate; throat glabrous. *Stamens* 5, inserted on the throat of corolla; filaments short; anthers ovate, sagittate, apiculate. *Ovary* 4 celled above, 2 celled below; style exserted; stigma white, narrowly clavate; ovules very many on bifid placentas. *Pseudocarp* large, fleshy, orange coloured, 2-2.5 in. across. *Seeds* minute, angular, not winged; albumen fleshy; embryo clavate.

Common throughout ASSAM.

Wood soft, white or reddish. Used for packing boxes, planks and manufacture of matches.

Flrs. 12-7. Fr. 5-10.

5. NAUCLEA Linn.

Trees or shrubs. *Leaves* petiolate or sessile; stipules large, caducous or sub-persistent. *Flowers* pentamerous, sessile, in solitary or crowded globose pedunculate heads. *Peduncles* terminal, often thickened near the apex; bracts often large,

caducous; bracteoles smooth, subulate. *Calyx* tube pruinose, not united with each other; segments 5, deciduous, linear, subulate, usually tipped with valvate processes. *Corolla* infundibuliform; lobes 5, short, imbricate; throat glabrous. *Stamens* 5, on the throat of the corolla; anthers oblong or linear, included. *Ovary* 2-celled; style long, thickened; stigma globose; ovules numerous, pendulous. *Fruit* 7 in., of 2 dehiscent many seeded cocci (·2 in.), which are pubescent outside. *Seeds* flattened, winged; embryo clavate.

Calyx lobes purplish. Corolla glabrous.
Leaves shortly petioled; base narrowed
into the petiole.

1. *N. Griffithii*.

Calyx lobes not purplish. Corolla grey-
pubescent. Leaves almost sessile from
a cordate base.

2. *N. sessilifolia*.

1. **Nauclea Griffithii Haviland** (=Adina Griffithii Hook. f.) Vern. *Dieng-soh*, Khasi.

A large tree, buttressed, often with a few aerial roots. *Bark* greenish-grey, with vertical fissures at places and with faint horizontal wrinkles, covered with numerous dark brown warts; inside pale dun-brown to rosy pink, finely and somewhat mattedly fibrous. *Leaves* 4-7 by 1·5-4 in., elliptic-oblong, obovate or sub-orbicular, obtusely mucronate, thinly coriaceous, glabrous, minutely punctate beneath; lateral nerves 8-10 on either half, tertiary nerves finely reticulate; base narrowed into the petiole; petiole 2·6 in. long. *Peduncles* 1-3, terminal, flattened up to the bracts, club-shaped above, 1·5-3 in. long, speckled with lenticels. *Flower buds* usually purplish, pale, slightly scented; bracteoles club-shaped, rusty hairy. *Calyx* white, hairy, becoming bristly in fruit. *Corolla* glabrous; lobes imbricate with minute purple tips, ovate; stigma exserted, globose. *Capsule* flatly 4-gonous, ·3 in.

Barapani, Nongkhlaw (KHASI HILLS), MANIPUR (Watt No. 7295) ascending upto 4,000 ft.

Flrs. 9. Fr. 12-2.

2. **Nauclea sessilifolia Roxb.**

A large deciduous tree. *Leaves* 3-5 by 2-4 in., ovate or elliptic-oblong, obtuse, entire, coriaceous, glabrous, dark green

above, pale beneath; lateral nerves 7-9 on either half, rigid, arched, almost sessile from a cordate base. *Heads* terminal on robust mostly solitary peduncles, 2-3 in. long. *Flowers* shaggily silky. *Calyx-segments* 5, clavate, villous, acute. *Corolla* lobes adpressed, grey, pubescent or villous. *Stigma* clavate. *Capsule* 3 in.

CACHAR.

Flrs. 11-12. Fr. 3-4.

Nauclea orientalis L. described under *Sarcocephalus cordatus* Miq.

6. ADINA Salisb.

Tall or small trees, deciduous or evergreen. *Leaves* peltioled; stipules large, caducous on its development. *Flowers* pentamerous, small with numerous filiform bracteoles, densely crowded in solitary or panicled globose heads. *Calyx* tube angled; segments 5, distinct. *Corolla* funnel-shaped or tubular; lobes 5, valvate; throat glabrous. *Stamens* 5, on the mouth of the corolla; filaments short. *Ovary* 2-celled; style filiform; stigma clavate or capitate; ovules many. *Capsule* small of 2 cocci dehiscent from below, many seeded. *Seeds* oblong, winged; endosperm copious, fleshy.

Leaves cordate (orbicular or broadly ovate). Calyx segments linear, pubescent beneath, deciduous.

1. *A. cordifolia*.

Leaves lanceolate, elliptic-lanceolate or oblanceolate, glabrous and glossy (like mango leaves). Calyx segments oblong-obtuse, persistent.

2. *A. polycephala*.

Leaves oblong or elliptic, slightly puberulous beneath. Calyx limb entire (not distinctly lobed), persistent.

3. *A. oligocephala*.

1. Adina cordifolia Hk. f. Vern. *Phinkona*, Jharua; *Tarakchapa* Ass.; (*Goalp.*); *Karan*, Nep.; *Komalbola*, Rava; *Sandang*, Garo; *Bagting-phang*, Kach.; *Ting-khop-thing*, Kuki; *Haldu*, Hind.; *Dieng-thing-pholo*, *Thing-pholo-arong*, Khasi; *Lanpatia*, Ass., (Kamrup).

A large deciduous tree with a spreading crown, trunk usually buttressed at the base. *Bark* light grey, .75 in. thick, exfoliating in patches; blaze light red inside with white

streaks, wood yellow; young parts pubescent. *Leaves* 3-9 in. long, and broad, broadly ovate or orbicular-cordate, abruptly acuminate, coriaceous, glabrate above, pubescent beneath; lateral nerves 5-8 pairs, basal pair branching close to the midrib; petiole 1·2-4·5 in.; stipules 5-1 in. long, elliptic-obovate, concealing the terminal bud. *Flowers* yellow in globose, pedunculate heads. *Calyx tube* 5, angled-pubescent outside; segments 5, valvate. *Stamens* 5, on the mouth of the corolla; filaments short. *Ovary* 2-celled; ovules many in each cell; style filiform, exserted; stigma clavate. *Fruit* of numerous capsules each separating into 2 dehiscent cocci. *Seeds* minute, many, winged; endosperm copious, fleshy.

Common throughout the Province with the exception of UPPER ASSAM.

Wood yellow when fresh cut, afterwards changing into reddish brown, compact, moderately hard; wt. 40-50 lbs. per c.ft. Heart wood and annual rings not distinct, seasons well, takes a good polish and is fairly durable. Suitable for turnery, manufacture of combs, furniture and agricultural implements.

Flrs. 4-7. Fr. 8-1.

2. Adina polycephala Benth. Vern. *Thing-khum*, Lush.; *Thukel*, Kuki.

A small tree, trunk obscurely fluted; young branches slender, striate. *Bark* grey or brownish rough, exfoliating in irregular flakes, ·25 in. thick; inside reddish, turning dark-brown, fibrous. *Leaves* 3·5-7 by ·9-2 in., lanceolate or elliptic, lanceolate or oblanceolate, entire, caudate, acuminate, coriaceous, glabrous, glossy green (like mango-leaves); lateral nerves 7-10 on either half, subparallel, arcuate, obscure towards the apex; petiole ·2-·5 in. long. *Heads* small, ·35 in. across, pedunculate, in trichotomously branched terminal, panicles, ramification slender; peduncles and pedicels glabrous or puberulous. *Calyx-tube* short, pubescent; segments oblong—obtuse, persistent. *Corolla* glabrous, tube ·1 in. long; lobes 4-5, ovate, persistent. *Style* exserted; stigma clavate. *Capsules* ovoid, crowned by the calyx limb. *Seeds* minute, very shortly winged.

K and J. HILLS, LUSHAI HILLS and CACHAR.

Flrs. 10-12. Fr. 3-4.

3. Adina oligocephala Havi. Vern. Haludsapa,
Dimapur (Sibsagar).

A middle sized tree. *Leaves* 4·9·5 by 2·5·4·5 in., oblong or elliptic, bluntly acuminate, entire, thinly coriaceous, glabrescent above, slightly puberulous beneath; lateral nerves 4·5 on either half, prominent beneath, more or less parallel, arcuate; base acute, sometimes unequal; petiole 4·1·6 in. long. *Flowers* in trichotomous, leafy panicled heads, which are about 1 in. diameter. *Calyx* limb entire (not distinctly lobed), persistent. *Corolla* funnel-shaped; lobes ovate. *Style* exserted; stigma, clavate. *Capsules* obovoid, slightly oblique; crowned by the calyx limb. *Seeds* minute.

NOWGONG, SIBSAGAR, KHASI HILLS.

Flrs. 1-2. Fr. 3-4.

7. UNCARIA Schreb.

Climbing shrubs with axillary tendrils (sterile peduncles) often changed into recurved hooks. *Branchlets* usually angular. *Leaves* petiolate; stipules entire or bifid. *Flowers* in globose axillary and terminal, solitary or panicled heads. *Peduncles* become woody ultimately on development; bracts in pairs; pedicels sometimes elongated in fruit. *Calyx-tube* fusiform, 5 fid or partite. *Corolla* long, funnel-shaped, throat glabrous; lobes usually valvate. *Stamens* 5, adnate to the throat of the corolla; filaments short; anthers with 2 basal bristly appendages. *Ovary* 2-celled; style slender; stigma generally capitate; ovules many. *Fruit* a head of elongated septicidally 2-valved many seeded capsules. *Seeds* small with testa winged at both ends; albumen fleshy.

Capsule pedicellate; bracteoles 0. Corolla tube hirsute. Calyx-segment linear.
Capsule sessile; bracteoles filiform :—

1. *U. macrophylla*.

Calyx segments linear. Leaves hirsute;
lateral nerves 9.

2. *U. pilosa*.

Calyx limb entire or segments very
short :—

Lateral nerves 7-8.
Lateral nerves 4-5 :—

3. *U. homomalla*.

Leaves submembranous (not glaucous). 4. *U. levigata*.

Leaves coriaceous, glaucous beneath. . .

5. *U. sessilifructus*.

1. Uncaria macrophylla Wall. Vern. *Barasilata*, Ass.; *Baira*, Kach.; *Apua-chuni-rikang*, Mik.

A large woody climber; stem ribbed. *Branchlets*, petioles and peduncles rusty pubescent. *Leaves* 4-6.5 by 2.5-4 in., entire, ovate, oblong, bluntly acuminate, glabrous, rusty-tomentose beneath; lateral nerves 6-8 on either side, veins reticulate, prominent beneath; base subcordate; petiole 1-3 in. long. *Flowers* (16-200 in each head) in slender pedunculate terminal as well as axillary heads. *Peduncles* bracteate near the top. *Calyx* segments linear, as long as tube. *Corolla* hirsute outside. *Capsule* about 1.7 in. long, spindle-shaped. *Fruiting* pedicels as long or longer than the capsule. *Seeds* very minute.

SYLHET, SIBSAGAR, LAKHIMPUR, N. CACHAR HILLS,
Flrs. 12-1. Fr. 1-2.

2. Uncaria pilosa Roxb. Vern. *Subekbek*, Mik.

A large, stout, straggling and climbing shrub. *Branchlets* pubescent, obscurely angled. *Bark* greyish white, warty, having minute rectangular fissures. *Leaves* 2-6 by 1-3 in., entire-ovate, elliptic, acuminate, sub-membranous, pilose or scaberulous above, pubescent beneath; lateral nerves 8-10 on either half; base subcordate or rounded; petiole 1-3 in. long; stipules recurved. *Flowers* light green to dun-yellow, scented, in axillary stout pedunculate heads. *Peduncles* gradually narrowed from a thick base, bracteate in the middle; tomentose. *Calyx* hirsute; segments linear pubescent, as long as tube. *Corolla* tube very slender, yellowish. *Capsules* clavate, almost sessile, tipped by the long calyx segments.

LAKHIMPUR, N. CACHAR, SIBSAGAR.

Flrs. 4-5. Fr. 7-9.

3. Uncaria homomalla Miq.

A climber; branches pubescent. *Leaves* 2-3 by 1.1-6 in., oblong, ovate, elliptic-lanceolate, acuminate, subcoriaceous, glabrous above, (puberulous on the nerves only), sparsely hirsute beneath; lateral nerves 7-8 on either half, subparallel, impressed above, prominent beneath; petiole 3-4 in. long, hirsute; stipules bilobed; segments subulate, hirsute. *Peduncles*

pubescent, axillary, solitary, tapering upwards from a stout base, bracteate above the middle; bracteoles filiform. *Heads* ·6 in. across. *Flowers* sessile. *Calyx* limb obscurely toothed; segments ovate. *Corolla* tube ·3 in. long, hirsute. *Receptacle* small, hirsute. *Capsule* not seen.

LUSHAI HILLS (Fort Lungleh., Gage No. 28).

Flrs. 3.

4. *Uncaria laevigata* Wall.

A large scandent shrub, branches 4-angled. *Leaves* 3·5-6 by 2·4 in., elliptic or ovate-lanceolate, bluntly acuminate, sub-membranous, glabrous, shining above; lateral nerves 4-6 on either half, slender, arched, tertiary nerves finely reticulate, almost invisible; base usually rounded; petiole ·2·4 in. long, supported by a hooked axillary spine; stipules 2-fid. *Flowers* small, (about ·6 in. long), sessile in solitary pedunculate head (·2·3 in. across in buds, 1·5 in. across when flowers are mature). *Calyx* obscurely toothed. *Corolla* filiform, glabrous. *Capsules* sessile, ·25·5 in. long.

KHASI HILLS (Tharia, 45023—Clarke) 1,000 ft.: MANIPUR (Watt 7294) 5,000 ft.

Flrs. 10. Fr. 4.

5. *Uncaria sessilifructus* Roxb. Vern. *Sarpi-chaithi-rikang*, Mik.; *Boira-dhuka*, *Boira*, Kach.; *Nupang-rakroi*, Kuki; *Boroki-ankora*, *Barakhialata*, Ass.; *Dahini-lahiri*, Nep.; *Dumilsibudu*, Garo; *Borhi-kata*, Ass. (Kam.).

An extensive climber; stem woody. Branches 4-angled; young shoots and leaves red with pubescent curved axillary hooks. Leaves 2·4·5 by 1·2·8 in., elliptic, bluntly acuminate, entire, thinly coriaceous, glabrous, shining above, pale beneath, somewhat glaucous; lateral nerves 3-5 on either side; tertiary nerves finely reticulate; base somewhat rounded; petiole ·2·5 in. long. Flowers in 1·1·5 in. long in slender pedunculate axillary or terminal panicled heads, bracteate in the middle. *Calyx* segments very short, rounded. *Corolla* tube slender; lobes yellowish, glabrous and silky. *Capsules* sessile, turgid and pubescent.

Common throughout ASSAM.

Flrs. 10-11. Fr. 12-2.

8. HYMENOPOGON Wall.

Small epiphytic shrubs. *Leaves* deciduous; stipules large, persistent with fleshy axillary bristles. *Flowers* white, corymbose; bracts large, foliaceous, reticulated. *Calyx* 5-partite, persistent. *Corolla* salver-shaped; tube long; lobes 5. *Stamens* 5, included in the inflated summit of the tube. *Ovary* 2 celled; style filiform; stigmas 2, linear; ovules many. *Capsules* crowned with the calyx, opening at apex in valves, many seeded. *Seeds* long, tailed at both ends; embryo minute; albumen copious.

Leaves oblanceolate, elliptic or obovate-lanceolate; lateral nerves 12-20 on either half.

Corolla 1·5-2 in.

1. *H. parasiticus*.

Leaves subfalcate, lanceolate; lateral nerves 28-35 on either half. *Corolla* 7 in.

2. *H. assamicus*.

1. *Hymenopogon parasiticus* Wall.

A deciduous straggling (usually) epiphytic shrub. *Bark* smooth, pale brown, exfoliating in papery pieces. *Leaves* 3-10 by 1·4 in., crowded towards the ends of branches, obovate—oblanceolate or elliptic, lanceolate—acuminate, membranous, puberulous on both surfaces, green above, pale beneath; lateral nerves prominent beneath, 12-20 on either half; base attenuate; petiole 2·5 in. long. *Flowers* white, conspicuous, in corymbs; primary branches usually bearing long petioled, white leafy, reticulated bracts. *Calyx* puberulous; segments linear. *Corolla* white, 1·5-2 in. long; lobes spreading, usually hairy towards the margin. *Capsules* 5-7 in. long, sessile, torpedo-shaped, pubescent, crowned with the persistent, calyx segments, bluish white when ripe. *Seeds* conspicuously long, tailed at both ends.

KHASI HILLS—Mairang (on *Quercus dealbata*), Shillong Peak, Serrarim—4,600 ft.

Fls. 6-7. Fr. 8-10.

2. *Hymenopogon assamicus* Hk. f.

A small straggling shrub. *Leaves* 9-12 by 2-2·5 in., lanceolate, finely acuminate, subcordate, glabrous; lateral nerves 28-35 on either half, almost straight, subanastomosing near the margin to form an intramarginal vein, tertiary nerves

inconspicuous; base cuneate; petiole 4·8 in. long, margined; stipules 6 by 4 in., ovate— acuminate, membranous. *Flowers* 6·8 in. long, in much branched bracteate racemes, the whole forming a terminal panicle about a foot long. *Calyx* urn-shaped. *Corolla* slightly pubescent without. *Style* slightly exserted. *Floral leaves* narrow, lanceolate, 2·5-3 in., strongly reticulate. (Fruit not seen.)

(From G. Mann's original sheet in Calcutta Botanic Garden).

KHASI HILLS.

9. HYMENODICTYON Wall.

Trees or shrubs with bitter bark and soft wood. *Leaves* petioled, deciduous; stipules usually glandular— serrate, deciduous. *Flowers* usually pentamerous, in simple racemes or panicles, with a few large leafy reticulate persistent bracts; bracteoles deciduous. *Calyx* tube ovoid; segments deciduous. *Corolla* tube slender, expanding in a campanulate or funnel-shaped 5-lobed limb; lobes valvate. *Stamens* 5, inserted below the corolla throat; filaments short, attached to the back of broad connective; anthers linear. *Ovary* 2-celled; style filiform, exserted; stigma capitate; ovules many. *Capsule* loculicidally 2 valved. *Seeds* numerous, winged all round, bifid below; albumen fleshy; embryo minute.

Flowers pedicellate, in compound panicled racemes. Leaves pubescent.

1. *H. excelsum*.

Flowers nearly sessile, fasciculate, in drooping simple spikes. Leaves pubescent, along the nerves beneath when young, afterwards glabrous.

2. *H. flaccidum*.

1. Hymenodictyon excelsum Wall. Vern. *Kodom*, *Phurkundi*, *Bhurkhundi*, Ass.; *Inglongallokoho-arong*, *Lo-keho—arong*, Mik.; *Bon-homjeng*, Kach.; *Choi-bong-thing*, Kuki; *Kel-kodom*, Mech; *Ding-dolobong-sir*, Khasi; *Bodi-kiru-chongipa*, *Wakandi*, *Boldikam*, *Mebol*, Garo; *Baja-phuty*, (Kamrup); *Lati-korum*, Nep.; *Uthamban*, Manip.

A large deciduous tree. *Leaves* turning yellowish before falling. *Bark* brownish-grey, smooth on branches and poles, soft and corky on old stems; inside softly fibrous, light-dun with broad distant white streaks, 1 in. thick. *Leaves* 4·9 by 2·5-5 in., elliptic-ovate or obovate—oblong, acuminate,

membranous, pubescent; lateral nerves 7-10 on either half; base narrowed into the petiole or acute; petiole 1-3 in. long; stipules oblong, with a broad base, caducous, usually glandular—serrate. *Flowers* white, fragrant, 2-3 in. long, densely crowded on terminal branched panicles; bracteoles minute; pedicels slender. *Calyx* minute, pubescent; segments deciduous, acute. *Corolla* pubescent outside; tube more than 3 times the length of calyx lobes, slender; limb cup-shaped; lobes 5, valvate. *Stamens* 5, inserted below the throat of the corolla; filaments dilated upwards. *Ovary* 2-celled; ovules many; style slender, long-exserted; stigma capitate. *Capsules* ellipsoid, 6-1 in. long, reddish-brown when ripe, on recurved pedicels, 2 valved, many seeded. *Seeds* many, lenticular, winged all round; wing deeply cleft at the base.

KAMRUP, NOWGONG, N. C. HILLS, SIBSAGAR and CACHAR.
Leaves used as buffalo fodder.

Flrs. 7-8. Fr. Cold season.

2. *Hymenodictyon flaccidum* Wall. Vern. *Meisyrkan*, Khasi.

In Mr. Gamble's opinion it is an epiphyte but according to Sir G. King Wallich's *H. flaccidum* was a tree; (found growing epiphytically on a huge *Cinnamomum Tamala* tree (5243) at Tura, Garo Hills and also growing on rocks at Nongkhla, Khasi and Jaintia Hills (6358); young shoots warty. *Leaves* 3-11 by 3-6.5 in., elliptic, obovate, acuminate, membranous, minutely pubescent beneath, especially along the nerves when young, afterwards glabrous; lateral nerves 7-9 on either half, sub-equidistant, slender, arched; petiole 2-6 in.; stipules membranous, broadly ovate, caducous. *Flowers* almost sessile, spicate, 5.9 in. long, each spike-like; raceme being supported by an elliptic or lanceolate bract, 3 by 1.4 in., stalk 2-3 in. long. *Calyx* narrowly cup-shaped. *Corolla* glabrous; tube short, less than twice the length of calyx lobes. *Style* exserted. *Capsules* reflexed, .6 in., sparingly spotted. *Seeds* with membranous bifurcate wings, margins of which are lacerated.

GARO HILLS, (Tura Sanitorium,) KHASI & JAINTIA HILLS (Nongkla).

Flrs. 6-8. Fr. 10-12.

10. CINCHONA Linn.

Evergreen shrubs or trees, bark bitter, coppices freely; stipules deciduous. *Flowers* pentamerous, scented in terminal panicles. *Calyx* pubescent outside, 5-toothed, persistent. *Corolla* tubular, pubescent outside; lobes valvate in bud; margin pilose. *Ovary* 2-celled; style filiform, bifid; papillose inside. *Capsule* 2-celled, 2-valved, with septicidal dehiscence from the base. *Seeds* many, peltate, winged; edges lacerated; albumen fleshy.

Pits in the axils of secondary nerves not present:—

Flowers red in short corymbiform cymes.

Corolla tube densely silky. 1. *C. officinalis*.

Flowers pale, flesh-coloured in pyramidal panicle; cymes few fld. Corolla lobes only fringed with hairs. 2. *C. Calisaya*.

Pits in the axils of secondary nerves not present:—

Leaves glabrous. Flowers yellowish-white. 3. *C. Ledgeriana*.

Leaves softly pubescent or tomentose.

Flowers rose-coloured. 4. *C. succirubra*.

Cinchona plantation was started in Khasi Hills at Nongkhlae as early as 1867, also in Jirang.

This was stocked with *Cinchona succirubra* Pavon and *mierantha* Ruiz et Pavon from Bengal plantation. A supply of seeds of *C. officinalis* Linn. was received from the same source at a later date. The plantation remained in charge of Mr. Bierman for about 3½ years. As the Bengal plantations were promising it was not considered worth while to extend the Khasi Hills plantation.

There were in all 13 plots of plantations, in the areas quoted above, Jirang being the highest elevation.

Samples of barks of *C. succirubra*, *C. officinalis* and *C. mierantha*, from the different plantations were sent to Govt. Quinologist in Darjeeling and best results were obtained from *C. succirubra*, which also thrived well on these hills.

"The Cinchona trees of Jirang approached the natural term of their existence (18 years old) in comparison with the other two areas. They served the purpose for which they were planted i.e., to ascertain if Cinchona will grow in the Khasi Hills, which they will."

The plantations have been abandoned. The following species are now being experimented on in the Khasi Hills (Umsaw), Garo Hills (Tura Peak) and Mikir Hills—*C. Ledgeriana*, *C. succirubra*, and *C. Ledgeriana* × *C. succirubra*. The last two centres have since been closed.

1. *Cinchona officinalis* Linn.

Leaves 3-6 by 1·2·5 in., ovate-lanceolate, lanceolate or elliptic-lanceolate, acute or acuminate; glabrous above with

hairy pits at the axils of the nerves; lateral nerves 6-10 on either half; base attenuate or acute; petiole 6-1·4 in. long. *Flowers* red in corymbiform cymes, terminal or axillary. *Corolla-tube* 5·7 in. long, densely silky. *Capsule* ovoid-oblong, about 6 in. long.

Was cultivated in KHASI HILLS (Nongkhlaw).
Quinine contents of bark 1.75-10.6%.

2. *Cinchona Calisaya Weddell.*

Leaves 3-6 by 1·5-2 in., oblong-lanceolate, elliptic-lanceolate or obovate-lanceolate, obtuse or acute, coriaceous, glabrous; lateral nerves 6-9 on either half, slender, axillary, pits rather inconspicuous; base acute or cuneate; petiole 4·9 in. long. *Flowers* pale flesh coloured in cymes, arranged in terminal pyramidal panicles, sometimes also axillary. *Corolla* 3·6 in. long; lobes with a white fringe of hairs. *Capsule* 3·6 in. long, ovoid-oblong.

Was cultivated in Khasi Hills (Nongkhlaw).
Quinine contents of bark 4%.

3. *Cinchona Ledgeriana Moens.*

A small tree. *Leaves* 3-6 by 1·2 in., elliptic-oblong or elliptic-lanceolate, obtuse or acute, coriaceous, glabrous; lateral nerves 5-8 on either half (without axillary pits); petiole 4·1 in. long. *Flowers* strongly scented, yellowish, in large terminal, few flowered cymes arranged in pyramidal panicles (often running down to the 2nd pair of leaves); pedicels 1·6 in. long. *Corolla* 3·6 in. long; tube pentagonal; lobes fringed with long white hairs. *Capsule* 3·6 in. long, elongate, ovoid, crowned with the remains of the calyx.

Cultivated in K. & J. HILLS, GARO HILLS and Mikir Hills (SIBSAGAR).

Quinine contents of bark 4-13%.

MIKIR HILLS—	Root	Stem	Branch
Quinine Alkaloids	4·4%	3·6%	3·34%

4. *Cinchona succirubra Pavon.*

A large tree. *Leaves* 4-10 by 2·5-6 in., elliptic, suborbicular or broadly ovate, acute, coriaceous, softly tomentose

beneath; lateral nerves 6-10 on either half, prominent (without axillary pits); base cuneate or acute; petiole 1·1-1·5 in. long. *Flowers* rose-coloured, in cymes arranged in thyrsoid terminal or axillary panicles. *Corolla* 5-7 in. *Capsule* ellipsoid, oblong, elongated, 1·1-1·4 in. long.

Cultivated in KHASI HILLS, GARO HILLS & SIBSAGAR—Mikir Hills.

Bark contents:—

Quinine 0·82-1·37%

Cinchonidine 3·2-5·13%

A hybrid *C. Ledgeriana* × *C. succirubra* is also being tried now in the province.

11. LUCULIA Sweet.

Luculia Pinceana Hook. Vern. *Soh-khlih*, *Dieng-sympiakhli*, *Dieng-tew-khohir*, *Dieng-doh-khlee*, *Dieng-pansingiang-khlih*, *Snam-mau-synrang*, Khasi.

A tall erect shrub; stem ash-coloured, wood cream-coloured, old leaves scarlet or turning greenish red. *Leaves* 2-6 by 1·8-2·5 in., entire, elliptic, acuminate, coriaceous, usually pubescent on the nerves beneath; lateral nerves 11-16, on either half, ascending, subparallel; base narrowed into the petiole (1·25-1·7 in. long). *Flowers* large, pinkish, fragrant, glabrous, pedicelled, in terminal or axillary, branched corymbose cymes. *Calyx-segments* spathulate, greenish; margin and base inside tipped reddish brown with a distinct midrib. *Corolla* hypocrateriform; tube about 1·75 in. long; lobes imbricate in bud with interposed tubercles at the sinuses, which appear like a corona, adnate to the corolla and only partly, free at the sinuses. *Stamens* 5; filaments filiform, sub-adnate to the corolla tube; anthers linear-oblong, adnate to the filament. *Ovary* 2-celled; style slender, shorter than the corolla tube; stigma 2, linear, recurved at the tips. *Capsule* 5-1 in. long, obovoid, usually with ribbed valves. *Seeds* many, minute; testa wrinkled, winged at either ends.

Common specially towards the eastern part of KHASI HILLS, on limestone formation. Mishmi Hills.

Flrs. 9-11. Fr. 4, but persists long afterwards.

12. WENDLANDIA Bartl.

Shrubs or small trees. *Leaves* opposite or ternate; stipules often persistent, entire or 2-fid. *Flowers* small, rosy or white in dense axillary or terminal panicled cyme, 2-3 bracteolate. *Calyx* tube globose with 4-5 subequal pubescent lobes. *Corolla* hypocrateriform or funnel-shaped, 4-5 lobed, imbricate in bud. *Stamens* 4-5, between the corolla lobes adnate to the tube; anthers exserted, versatile. *Ovary* usually 2-celled, rarely 3-celled; ovules many on globose axile placentas; style filiform; stigma entire, bifid or two partite. *Capsule* small, globose, 2 valved, many seeded. *Seeds* minute, compressed, obscurely winged; embryo short, albumen fleshy.

Leaves opposite :—

Corolla tube short less than twice the length of lobes :—

Capsule 1 in. long :—

Corolla lobes equaling tube or slightly longer. Leaves 4-9 in. long; lateral nerves up to 20. . . .

1. *W. exserta*.

Corolla lobes shorter than the tube. Leaves 3-7 in. long; lateral nerves up to 12. . . .

2. *W. puberula*.

Capsule .06 in. long :—

Corolla lobes recurved a little shorter than the tube. Leaves 3-7; lateral nerves up to 10. . . .

3. *W. Wallichii*.

Corolla tube twice the length of lobes or longer :—

Calyx hairy :—

Corolla lobes shorter than the tube. Leaves glabrous above (mature), glabrate beneath. . . .

4. *W. tinctoria*.

Corolla lobes half the length of the tube or less. Leaves scaberrulous above and harshly pubescent beneath. . . .

5. *W. paniculata*.

Calyx glabrous :—

Calyx teeth minute. . . .

6. *W. glabrata*.

Calyx teeth nearly as long as the tube. . . .

7. *W. coriacea*.

Calyx teeth longer than the tube. . . .

8. *W. ligustrina*.

Leaves usually in whorl of 3 :—

Calyx glabrous, teeth as long as tube;

stigma clavate; style far exserted. . . .

9. *W. pendula*.

(I have followed Brandis. Dr. Cowan has recently dealt with the genus *Wendlandia* in details in the "Notes from the Royal Botanic Garden, Edinburgh, number LXXX, Vol. XVI, October, 1932").

1. *Wendlandia exserta* DC. Vern. Kadam, Ass.

A small evergreen tree with rough brown bark, cracking longitudinally, and exfoliating in long strips. *Branchlets*, leaves and inflorescence grey pubescent or hoary. *Leaves* 4-9 by 1-3·5 in., entire, ovate, lanceolate or narrow oblong, acuminate, coriaceous, glabrate or pubescent above, softly tomentose beneath; lateral nerves 12-20 on either half, subparallel; petiole 1-5 in. long; stipules ovate, recurved. *Flowers* white, sessile, ·15 in. across, fragrant in pyramidal panicles of cymes up to 10 in. long. *Calyx* grey tomentose; segments subulate. *Corolla* funnel-shaped, broad, recurved; lobes reflexed. *Stamens* alternating with the lobes; filaments equalling the anthers, which are exserted. *Style* bifid. *Capsule* hoary, pubescent, ·1 in. long, crowned by the erect lanceolate hairy calyx-segments.

Jokai Reserve, LAKHIMPUR; Apha River, SYLHET. (Kanjilal).

Flrs. 4-5. Fr. rainy season.

2. *Wendlandia puberula* DC. Vern. Karakholi, Kadam, Ass.; Papka-changne, Duff.; Snam-maie, Khasi; Rismini, Mech; Theng-merok, Mik.; Mau-thok-rai-phang, Kach.

A small tree. *Bark* brown-grey, soft, corky, closely and somewhat spirally fissured; blaze copper brown changing very dark brown, fibrous; innovation puberulous. *Leaves* 3-7 by 1-3 in., elliptic or oblong, acute, acuminate, rather membranous, glabrous above, except along the nerves, with brown pubescence along the midrib and nerves beneath; lateral nerves 9-12 on either half; petiole 1-3·7 in. long; stipules 1-3·8 in. long, usually caudate acuminate, persistent. *Flowers* sessile, very small, bluish white. *Calyx* hairy; segments triangular. *Corolla* funnel-shaped; lobes shorter than the tube. *Filaments* as long as the anthers; anthers linear. *Style* bifid. *Capsule* about ·1 in. long, nearly glabrous.

NOWGONG, DARRANG, GOALPARA, SIBSAGAR, N. C. HILLS,
KHASI HILLS—ascending up to 4,000 ft.

Flrs. 2-4. Fr. 5-7.

3. Wendlandia Wallichii W. & A. Vern. *Dieng-sa-lakba-basow*, *Dieng-sha-mot*, Synt.; *Dieng-sai-moit*, *Dieng-ja-sau*, *Dieng-cha-kaba*, Khasi.

A shrub or a small tree often branched from near the ground (or rather growing in a clump). Bark cinnamon brown, corky, split lines vertical, about 15-25 in. apart, soft inside, light creamy-dun brown, astringent; young leaves reddish-brown, yellow when old. Leaves 3-7 by 1-2·5 in., opposite, sometimes ternate, glabrescent, almost coriaceous, entire, elliptic or elliptic-lanceolate; lateral nerves 8-10 on either side; prominent beneath, with a distinct midrib; base cuneate; petiole 2-3 in. long; stipules caducous, brown, ovate, acute. Flowers white, slightly scented; pedicels hairy; panicles pubescent. Calyx glabrous or obsoletely puberulous, lanceolate, teeth small, acute, broadly deltoid. Corolla white, tubular, tube about 3 times longer than the calyx; lobes ovate, spreading or slightly recurved. Anthers resting on the mouth of the corolla tube. Fruit globose, about .06 in. diam.

N. E. F. TRACT, SIBSAGAR, LIKHIMPUR, and KHASI HILLS, ascending up to 6,000 ft.

Flrs. 9-11. Fr. 12-2.

4. Wendlandia tinctoria DC. Vern. *Thengmerok*, Mik.; *Gauni-keuta*, *Rangapatiogach*, Ass.; *Dieng-ja-kybu*, *Dieng-joba*, *Dieng-khon-suet*, Khasi; *Dieng-sha-mot*, *Dieng-sha-lak-ba-khlow*, *Dieng-ja-lakba*, Synt.; *Borganchi*, *Bolnabat*, Garo.

A shrub or small tree; branches straggling or spreading. Bark smooth, brown to ash-coloured; corky and fibrous. Leaves 3-8 by 1-3 in., very strongly nerved, oblong, oblong-lanceolate or obovate, acuminate, glabrous above when mature, glabrate beneath; lateral nerves 10-12 on either half; base narrowed into the petiole, 2-3 in.; stipules ovate, keeled, cuspidate. Flowers sessile, white in pubescent, pyramidal panicles; bracts subulate. Calyx teeth oblong-ovate, hairy, persistent in fruit. Corolla slender; lobes shorter than the tube. Filaments short. Stigma oblong. Capsule

rounded, about .07 in. across, hairy, reddish-brown when ripe.

KAMRUP, SIBSAGAR, NOWGONG, N. C. HILLS, GARO HILLS and KHASI HILLS, ascending up to 3,000 ft.

The bark is used as a mortant in dyeing.

Flrs. 2-3. Fr. 4-5.

5. Wendlandia paniculata DC. Vern. *Dieng-sha-mot*, *Dieng-sa-lakba*, *Dieng-ja-lakba*, Synt.

A small tree with spreading crown. *Bark* dark brown, deeply and closely furrowed inside, very light, dun-brown, fibrous. *Leaves* rough, 2-6 by 1-3 in., entire, elliptic or oblanceolate, scaberulous above, harshly pubescent beneath, specially on the nerves; acute at both ends; lateral nerves 8-11 on either half; petiole .3-.8 in. long; stipules recurved, broad, orbicular, oblong or reniform, coriaceous, pubescent. *Flowers* sessile, white or greenish-white, in large villous spreading panicles. *Calyx* hairy, supported by one or two linear bracts; teeth rounded, shorter than the tube. *Corolla* funnel-shaped; lobes half the length of tube or less.

K. & J. HILLS—ascending up to 5,000 ft.

Flrs. Hot season. Fr. Cold season.

6. Wendlandia glabrata DC.

A small evergreen tree; young parts specially branches of inflorescence, minutely grey canescens, otherwise quite glabrous. *Leaves* 4-6 by 1.5-2.3 in., elliptic-lanceolate, sub-coriaceous, finely acuminate, dark green and glabrous above, reddish-brown underneath; lateral nerves 6-8 on either half, arched, prominent beneath, sometimes with tufts of hair in the axils; petiole .5-1 in., narrowly margined; stipules twice as broad as long, shortly cuspidate. *Flowers* yellowish, subsessile, about .15 in. long, in terminal pyramidal, panicles 6-10 in. long. *Calyx* glabrous; teeth minute, triangular. *Corolla* tube cylindrical or trumpet-shaped; limb reflexed. *Capsules* globose, 2-valved, about .06 in. across. *Seeds* minute.

NAGA HILLS, LUSHAI HILLS and MANIPUR—ascending up to 6,000 ft.

Flrs. 3-4. Fr. 5-6.

7. Wendlandia coriacea DC. Vern. *Kala tilka*, Nep.

An evergreen small tree or shrub. *Bark* brown. *Leaves* 3-6 by 1·8-1·5 in., entire, lanceolate, acuminate, coriaceous, shining above; lateral nerves 9-12 on either half, slender; base narrowed into the petiole; petiole 2·6 in. long; stipules erect, pointed. *Flowers* sessile, in densely flowered pyramidal panicle. *Calyx* glabrous; teeth nearly as long as the tube. *Corolla* tube slender; lobes oblong; stigma short.

DARRANG (opposite Rajakata).

Flrs. 1.

8. Wendlandia ligustrina Wall. Vern. *Theng-merok*, Mik.; *Man-thok-rai-phang*, Kach.

A much branched small tree. *Bark* greenish, with vertical split, 2·5 in. thick; inside white, turning brown, fibrous; old leaves red. *Leaves* 3-5 by 1·2-2 in., entire, obovate, lanceolate to elliptically lanceolate, acute, almost coriaceous, glabrous or puberulous on the nerves beneath; lateral nerves 7-8 on either half, sub-parallel; petiole 2·7 in. long; stipules adpressed, cuspidate. *Flowers* small, sessile, in lax pubescent panicle. *Calyx* glabrous; teeth filiform, longer than the tube. *Corolla* glabrous; lobes oblong, shorter than the tube. *Stamens* and styles exserted.

N. C. HILLS, KHASI HILLS.

Flrs. 1.

9. Wendlandia pendula DC.

An elegant somewhat straggling shrub, with slender pendulous branches; branchlets glabrous. *Leaves* usually in whorls of 3, almost sessile, (occasionally opposite) 3-4 by 1-2 in., ovate or ovate-lanceolate, obtusely acuminate, shining, pubescent on the nerves beneath; lateral nerves 6-7 on either half; base rounded or sub-acute; stipules small, triangular. *Flowers* clustered, in stout panicles 4-6·5 in. long. *Calyx* glabrous; teeth lanceolate, as long as the tube. *Corolla* tube 16-2 in. long; lobes oblong. *Stamens* shortly exserted. *Style* far exserted up to nearly twice as long as the corolla tube; stigma clavate.

MANIPUR. (Brandis).

Wendlandia grandis Cowan. W. tinctoria DC. Var. grandis Hk. f. Vern. *Bol-Borak*, Garo.

A tree 45'/35"; young branches brownish. Leaves 7·3 by 4·1 in., ovate or elliptic-ovate, abruptly short-acuminate, coriaceous; base cuneate; petiole glabrous, 1·4 in. long; stipules interpetiolar, triangular. Flowers fragrant, in fascicles, sessile. Calyx densely pubescent; segments obtuse—triangular. Corolla tube about 2 in. long, pilose inside; lobe ovate. Anthers ovate; filaments short. Style bifid, somewhat exserted.

Throughout the Province upto 4,000 ft. Kanjilal's No. 5175.

Flrs. 1-3. Fr. 4-5.

Wendlandia scabra Kurz.

Journal Asiatic Soc. Bengal XII (1872), p. 310 For. Flor. British Burma II (1877), p. 73.

W. paniculata Hk. f. F. B. I. III, p. 38 pro parte non. DC.

W. paniculata Hook F. I. C. pro parte vix. DC., Brandis Indian trees (1906), p. 374 pro parte.

W. paniculata DC. sub sp. Cowan in Craib. Fl. Siam Enun. II pt. 1 (1932), 22.

SYLHET, CACHAR, MANIPUR upto 4,000 ft.

(*The Genus Wendlandia by Dr. J. M. Cowan, in notes R. B. G. Edin. No. LXIX, October, 1932.*)

Argostemma verticillatum Wall.

A small delicate herb. Leaves 3-4 by 4-8 in., in a whorl of 4. sessile, lanceolate, acuminate, glabrous, unequal-sided; base sometimes oblique. Flowers 3 in. across, in umbels. Corolla valvate, 15 in. across; tube 4 in. long. Calyx-teeth acute. Anthers 5, free, apiculate, opening by pairs. Capsule 2-celled; seeds minute.

KHASI HILLS—Umsaw (Upto 4,000 ft.).

Flrs. 9. Fr. Cold season.

The following species of Argostemma (Leaves entire, membranous; stipules entire; corolla rotate; anther large; stigma capitellate; capsule 2-celled) occur in the region of the "Flora." They are small delicate herbs. It is not considered necessary to describe them in detail.

A. sarmentosum Wall. A. khasianum C. B. Clarke, A. pumilum Benn., A. rostratum Wall. A. humile Wall. and A. fragile Geddes.

13. HEDYOTIS Linn.

Shrubs, undershrubs or herbs, sometimes climbing. Leaves usually opposite, occasionally ternate; stipules conspicuous, furnished with bristles, sometimes connate.

Flowers tetramerous, white or lilac, in axillary or terminal lax, or compact capitate cymes. *Calyx* turbinate or ovoid; segments 4, acute, persistent. *Corolla* campanulate or funnel-shaped; lobes valvate in bud. *Stamens* 4, inserted on the tube or throat; filaments short. *Ovary* 2-celled; style filiform; stigma bifid or 2 lobed; ovules numerous on sessile or stalked axile placentas. *Fruit* a small coriaceous or crustaceous septicidal or loculicidal capsule or sometimes of 2 separate or connate cocci or quite indehiscent. *Seeds* plano-convex or angled; albumen horny; embryo clavate.

Climbing shrub; flowers white in compact compound subcorymbose cymes. 1. *H. scandens*.
Erect stout under-shrub; flowers bluish in globose bracteate heads. 2. *H. uncinella*.

1. *Hedyotis scandens* Roxb. Vern. *Bhedeli lot*, Ass., *Bonhrathrin*, Lush.; *Samreting*, Mikrisim, Garo; *Jermiskie, Meidi*, Khasi; *Tyllie-iamu-sem*, Synt.

A slender woody climbing shrub with glabrous green branches; young twigs minutely puberulous, somewhat herbaceous, older twigs glabrous. *Leaves* opposite, 2·75-4·25 by 1·65-1·5 in., narrow, oblong or elliptic lanceolate, gradually sometimes abruptly caudate, less often obtuse, acuminate, undulate, subcoriaceous, rather thick, glabrous and minutely punctate on both surfaces, paler beneath; lateral nerves somewhat obscure, about 5-6 on either half, arcuately ascending and meeting the upper pair; tertiaries fine, often sub-parallel; base narrowed to a marginated and channelled petiole, lower portion of petiole adnate to a membranous intrapetiolar stipular sheath which has a horizontal ridge near the top; two prominent cusps about 1 in. long, decurrent up to the ridge and is sometimes purple spotted, free end of sheath sparsely ciliate or erose. *Flowers* white, turning cream, 2-2·25 in. long, in axillary and terminal compact compound triochotomous subcorymbose puberulous cymes up to 1·5 in. long and about 2 in. across; peduncle 6-8 in. long; pedicels 1-1·15 in. long; bracts and bracteoles deciduous. *Calyx* tube dilated towards the apex; teeth 4, .06 in. long, oblong, space between the teeth sometimes minutely setose. *Corolla* valvate in bud, 4 lobed;

tube short; throat slightly ventricose and hairy; lobes oblong, reflexed, lower portion shaggy within. *Stamens* 4, alternating with the corolla lobes, included except for the tips of anthers; filaments minute-villous; anthers 2-celled, introrse. *Ovary* 2-lobed, 2-celled, top free from the calyx-tube; style glabrous at the base, thicker and pubescent above, the two parts faintly articulated; stigma shortly 2-lobed, exserted; ovules in each cell numerous on a peltate placenta from the dissepiment. *Fruit* capsular, globose, about 15 in. long, seated on the persistent calyx, apex extended between the calyx-teeth, dehiscing at the top and ultimately separating into 2 cocci; seeds minute, many, plenoconvex, with an irregular rim.

All over the province, ascending to 5,000 ft.

Used medicinally for eye diseases and after birth troubles. The roots are used with certain other medicines for sprains.

Flrs. mostly 10-1, according to locality and also at other times of the year. Fruits mostly cold season.

2. *Hedyotis uncinella* Hk. & Arn. Vern. *Sher-rit-arong*, Khasi.

An erect stout undershrub with perennial roots, stem glabrous, conspicuously 4-angled and ribbed, internodes long. *Leaves* 3-3.5 by 1.4-1.7 in., sessile, entire, ovate or ovate-lanceolate, acuminate, slightly pubescent above; nerves distinct, sub-basal; base acute or rounded; petiole 0.1 in. long; stipules small, glandular, sessile or stalked, pubescent. *Flowers* bluish in globose terminal or axillary bracteate heads. *Calyx* glabrous or ciliate; teeth recurved. *Corolla* tube short, glabrous; lobes linear. *Capsule* broadly ovoid.

KHASI HILLS, common.

Flrs. 7-9. Fr. Cold weather.

H. vestita Br.

A diffuse herb; branches terete; all parts villous. *Leaves* 2-3.5 in. long, lanceolate or narrow-lanceolate, acuminate; nerves prominent beneath, 5-7 on either half. *Cymes* small, axillary, shortly peduncled. *Capsule* minute.

CACHAR, KHASI and JAITIA Hills, Aka hills (15128).

H. tenelliflora Bl.

A glabrous diffuse undershrub; branches quadrangular. *Leaves* sessile, 1.1-1.5 by 1.5 in., linear-lanceolate, acuminate; margin revolute,

1-nerved; stipular cilia long. *Flowers* in few flowered clusters or solitary. *Calyx-teeth* rigid, ciliate. *Capsule* ovoid, glabrous.
KHASI HILLS. (upto 4,000 ft.).

Frs. & Fr. Rainy season.

H. hispida Retz. modern name *H. verticillata* (L.) Lamk.

A diffuse herb rather shrubby; branches scabrid. *Leaves* margin recurved; base acute; stipular cilia long. *Flowers* in axillary clusters. *Calyx* teeth triangular. *Capsule* ovoid, hispid.

GOALPARA (Kachugaon), CACHAR, KHASI HILLS, UPPER ASSAM.

Frs. & Fr. Cold season.

H. fulva Hook. f., is also recorded from Khasi Hills.

Oldenlandia nudicaulis Roth.

An erect annual, somewhat hairy. *Leaves* 1-1.5 by 5-7 in., ovate, membranous. *Flowers* in long-penduncled terminal lax cymes; branches capillary. *Calyx-teeth* minute and subulate. *Capsule* hemispheric.

KHASI HILLS (upto 5,000 ft.), UPPER ASSAM.

Fr. 10.

O. Heynii Br. **O. diffusa** Roxb. and **O. paniculata** Linn. also occur in the region of the "Flora."

14. ANOTIS DC.

Herbs, rarely undershrub, ascending or prostrate, rarely erect, sometimes with flaccid hairs; stipules scarious or bristly. *Flowers* small, in axillary and terminal cymes or heads. *Calyx-tube* short; segments 4, erect or recurved, with usually broad sinuses. *Corolla* tubular or funnel-shaped; lobes 4, usually shorter than the tube, valvate. *Stamens* 4, adnate to mouth of corolla; anthers linear, oblong, included or exserted. *Ovary* 2- rarely 3-4 celled; style filiform; stigmas 2-4, linear; ovules usually few on placentas arising from near the base of the septum. *Capsule* didymous or laterally compressed, usually loculicidal (rarely indehiscent). *Seeds* peltate, boat-shaped or plano-convex; testa coarsely pitted; embryo clavate; albumen horny.

Perennials :—

Fruit turgid, dehiscing loculicidally :—

Leaves linear-lanceolate up to 4 in. long. Calyx-teeth short.	1. <i>A. oxyphylla</i> .
Leaves ovate-lanceolate up to 2 in. long. Calyx-teeth large.	2. <i>A. ingratia</i> .

Fruit compressed, indehiscent :—

Leaves 3-1 in. long, sessile or sub-sessile, ovate. 3. *A. Wightiana*.

1. *Anotis oxyphylla* Wall.

An erect small undershrub, sometimes gregarious; stem stout, often rooting at the lower nodes, glabrous. Leaves 1·5-4 by 2·5 in., entire, linear-lanceolate, acuminate; coriaceous; lateral nerves 3 on either half, obscure; base narrowed into the petiole; petiole 1·2 in. long; stipules linear-lanceolate, sometimes laciniate. Flowers white with a light shade of pale purple in much divided pedunculate terminal subcorymbose cymes. Calyx teeth short. Corolla much larger than the calyx-tube. Capsules pedicelled, hemispheric; cells 5-8 seeded.

KHASI HILLS up to 6,000 ft.

Flrs. 9-10. Fr. Cold season.

2. *Anotis ingrata* Wall.

A straggling fetid undershrub or perennial herb with stout branches, 2-3 ft. high, hairy at the nodes. Leaves 1·5-2 by 5-6 in., ovate-lanceolate, obscurely crenate, acuminate, membranous, puberulous, specially on the nerves; lateral nerves 6-9 on either half, very slender; base cuneate; petiole 1·3 in. long; stipules bristly. Flowers white, shortly pedicelled, in terminal lax cymes. Calyx-teeth large. Corolla-tube 16 in. long; lobes oblong. Capsule didymous, hemispheric; cells many seeded.

KHASI HILLS, ascending up to 6,000 ft.

Flrs. 8-9. Fr. Cold season.

3. *Anotis Wightiana* Hk. f.

A diffuse perennial herb. Leaves 3-1 by 2·5 in., sessile or sub-sessile, ovate, entire, acute, pubescent; lateral nerves obscure; base rounded or acute. Flowers white, blue or purplish, shortly pedicelled, in small terminal 2-leaved involucrate capitate cymes arranged on short axillary branchlets. Fruit orbicular, compressed, 2-4 celled, indehiscent; cells 1-2 seeded; seeds rugose when dry.

KHASI HILLS.

Flrs. 9. Fr. Cold season.

Anotis gracilis Hk. f. and *A. urophylla* Wall are also recorded from KHASI HILLS. (F. B. I., pp. 71 and 72, vol. III).

Flrs. 8. Fr. later.

15. POLYURA Hk. f.

Polyura geminata Hk. f.

An undershrub (annual?) with rooting stem. *Leaves* 1·5 by 1·5-1·7 in., entire, opposite or whorled, elliptic to elliptic-lanceolate, obtuse or bluntly acuminate, membranous, glabrate above, pale beneath; lateral nerves 10-14 on either half, usually reddish-brown when dry, subparallel, arcuate; tertiary nerves zigzag; base narrowed into the petiole, which is often marginate (1·2-1·6 in. long); stipules filiform. *Flowers* pentamerous, white, crowded in long pedunculate axillary scorpioid cymes. *Calyx* lobes persistent. *Corolla* funnel-shaped; throat densely hairy; lobes valvate in bud. *Stamens* in the middle of the tube; filaments subulate; anthers bifid. *Ovary* 2-celled; style slender, puberulous; stigmas 2; ovules many. *Capsule* small, subglobose, many seeded, septicidal; embryo minute; albumen fleshy.

KHASI HILLS, ascending up to 4,000 ft.

Flrs. 7-10. Fr. Cold season.

Spiradielis bifida Blume.

A herbaceous plant, rather woody below, glabrous. *Leaves* 3-6 by 1-2 in., elliptic, elliptic-lanceolate or elliptic-ovate, acuminate. *Flowers* small, almost sessile along one side of the branches of a dichotomous terminal panicled cyme; panicle 4-8 in. long. *Calyx* segments 5. *Corolla* lobes 5. *Stamens* 5. *Ovary* 2-celled. *Stigma* lobed. *Capsule* small, sub-globose.

CACHAR, UPPER ASSAM, Aka Hills and KHASI and JAINTIA HILLS, up to 4,000 ft.

Flrs. 7-8. Fr. 8-9.

S. cylindrica Wall. KHASI HILLS, MISHMI HILLS.

16. OPHIORRHIZA Linn.

Ophiorrhiza ochroleuca Hk. f.

A small shrub, glabrous. *Leaves* 3-7 by 1·5-3 in., elliptic or elliptic-lanceolate, long acuminate, glabrous; lateral nerves 10-15 on either half; base narrowed into the petiole or acute; petiole 5-1 in. long; stipules 2-fid, lanceolate, caducous. *Flowers* secund on the branches of axillary or terminal dichotomous pubescent cymes; peduncles and branches stout; bracts 0 or obscure and caducous. *Calyx* teeth very short. *Corolla* tubular, cylindric, 3-5 in. long, 5-lobed; lobes short, recurved, pubescent within but not winged at the back. *Stamens* 5, inserted on the tube; anthers linear. *Disc* large, 2-lobed. *Ovary* 2-celled; style filiform; ovules many on basal ascending placenta. *Capsule* coriaceous, compressed, glabrous, pedicelled, 3 in. across. *Seeds* many, minute, angled; embryo clavate; albumen fleshy.

CACHAR, SIBSAGAR, KHASI HILLS (ascending up to 4,000 ft.).

Flrs. 3-7. Fr. 8-9.

Ophiorrhiza Harrisiana Heyne.

A low soft herbaceous plant, pubescent or tomentose. *Leaves* elliptic or elliptic-lanceolate, acute or acuminate, pubescent on the nerves underneath. *Flowers* pink in terminal cymes, usually tomentose; bracteoles short, deciduous. *Calyx-teeth* subulate. *Capsule* usually glabrous.

KHASI and JAINTIA HILLS, 5,000 ft.

Flrs. 5.

Ophiorrhiza hispida Hook. f.

A herbaceous plant, woody below, almost gregarious in Lakhimpur Dipterocarp forests; young plants hispid. *Leaves* 1-3 in., acuminate, puberulous; stipules large. *Flowers* in densely flowered terminal sub-globose cymes; peduncles short, hispid; bracteoles linear, ciliate. *Corolla lobes* hispid. *Capsule* hispid.

KHASI and JAINTIA HILLS, 4,000 ft. LAKHIMPUR.

Flrs. 8.

Ophiorrhiza Mungos Linn., *O. rosea* Hk. f., *O. Wallichii* Hk. f., *O. oppositiflora* Hk. f., *O. Griffithii* Hk. f., *O. Treutleri* Hk. f., *O. fasciculata* Don., *O. hispida* Hook f., *O. subcapitata*

Wall., *O. calcarata* Hook f., *O. nutans* C. B. Clarke, and *O. pauciflora* Hook. f. are also recorded from the region of the flora, specially from Khasi Hills.

(*F. B. I.* Volume III, Pp. 77-84).

17. SILVIANTHUS Hk. f.

Silvianthus bracteatus Hk. f.

A glabrous shrub; young parts often scabrid with short rusty hairs. *Leaves* 4-8 by 2-5 in., elliptic-obovate or lanceolate, irregularly toothed, sharply acuminate, membranous, glabrous; main lateral nerves 10-12 on either half, slender, much arched; petiole 7-1·7 in., occasionally 3 in.; stipules membranous. *Flowers* 5-8 in. long, in axillary and terminal bracteate cymes. *Calyx* purplish green, accrescent; segments 5, rarely 4. *Corolla* white, funnel-shaped, tube hairy within; lobes 5, short, reflexed, induplicate, valvate, sinuses plaited. *Disc* large. *Stamens* 2, on the corolla-tube; filaments short; anthers linear-oblong. *Ovary* 2-celled; style long; stigma spindle-shaped. *Capsule* globose, up to 3 in. across, crowned with the accrescent calyx. *Seeds* black, obliquely truncate at the upper extremity.

SYLHET; CACHAR; Nongpoh, Jowai (K. HILLS); Nichuguard, NAGA HILLS; MANIPUR.

Fls. 4-5. Fr. 9-10.

18. MUSSÆNDÆ Linn.

Shrub or undershrub, rarely herbs, erect or climbing, sometimes scandent, frequently very conspicuous by one of the calyx segments of some of the outer flowers developed into a large long petioled white or coloured leaf. *Leaves* opposite or ternately whorled; stipules free or connate, sometimes caducous. *Flowers* pentamerous, usually yellow, infrequently white or scarlet, in terminal cymes, rarely solitary. *Bracts* and bracteoles deciduous. *Calyx-tube* oblong or turbinate; segments usually deciduous. *Corolla* usually silky outside, tubular below, funnel-shaped above; throat villous; lobes valvate, with curled margins in bud. *Stamens* adnate to the throat or tube; filaments short; anthers linear. *Ovary* 2-celled; ovules many on peltate fleshy

placenta; style filiform; stigmas 2, linear. *Berry* fleshy, crown areolate. *Seeds* many, minute; testa pitted; embryo minute; albumen fleshy.

Calyx-teeth deciduous :—

- Berry globose, glabrous; lateral nerves 5-6 pairs.
- Berry usually obovoid with few scattered specks (not hairy); lateral nerves 6-8 pairs.
- Berry globose, laxly hairy; lateral nerves 7-10 pairs.

1. *M. glabra*.
2. *M. frondosa*.
3. *M. macrophylla*.
4. *M. keenani*.
5. *M. incana*.
6. *M. Roxburghii*.
7. *M. Parryorum*.
8. *M. Pentasemias*.

Calyx-teeth persistent :—

- Leaves glabrous. Berry white, succulent.
- Leaves villous. Berry areolate and with appressed hairs.
- Leaves strigose on the midrib beneath, sparsely setulose above. Berry areolate above with setaceous calyx segments.
- Leaves tomentose when young, brownish pubescent on the nerves above. Berry black when dry 3 in. long, very fine pubescent.
- Leaves pilose. Berry 3-4 in. long, green when dry, smooth.

1. *Mussænda glabra* Vahl. Vern. *Taksap-riube*, Miri; *Charbu-taru*, Duff.; *Khem-banju-doukha*, Khimbandai, Longderikang, Syntew-jah-rong-tham, Khasi; *Charai-atha*, Chuba-atha, Sonarupa, Ass.; *Wati-puon-phoi*, Kuki.

A large scandent often climbing shrub; bark brown, lenticellate. *Leaves* 2·5-3·5 by 1·5-1·6 in., elliptic or oblong-lanceolate, acuminate, coriaceous, glabrous or puberulous on nerves, glossy green; lateral nerves 5-6 on either half; petiole 2-5 in. long. *Flowers* in rather dense terminal puberulous cymes. *Calyx* campanulate; teeth subulate, shorter than ovary, deciduous; petaloid segment 2·5 by 1·5-2 in., white, often tinged with green, strongly nerved, on stalk 1-1·5 in. long. *Corolla* pubescent, 6-8 in. long; lobes as long as broad. *Berry* 5 in. long, globose, glabrous.

N. E. F. TRACT, LUSHAI HILLS, N. C. HILLS, SIBSAGAR, CACHAR, MANIPUR, KHASI HILLS, LAKHIMPUR, GOALPARA, ascending up to 4,000 ft.

Frs. 3-5. Fr. 6-12.

2. *Mussænda frondosa* Linn.

A scandent shrub. *Leaves* 2·6·5 by ·8·2·8 in., entire, ovate, elliptic-oblong, acuminate, glabrate above, pubescent beneath; lateral nerves 6-8 on either half, tertiary nerves reticulate, often inconspicuous; base acute, often cuneate; petiole ·2·1 in. long; stipules ·2··25 in., 2-fid. *Flowers* orange-coloured. *Inflorescence* dense and pubescent. *Calyx* deciduous; segments lanceolate twice the length of ovary or even longer. *Corolla* pubescent; tube about 1 in. long. *Berry* obovoid with few scattered specks (not hairy).

KHASI HILLS.

Flrs. 7-8. Fr. Cold season.

3. *Mussænda macrophylla* Wall. Vern. *Dieng-sa-lynthiah*, Synt.; *Dieng-tnow-tham*, (=Crab's claws), Khasi.

A large erect shrub with starggling branches, all parts more or less hirsute or villous; stem greyish. *Leaves* 2·6·5 by ·8·2·8 in., entire, elliptic or broadly elliptic, cuspidate, membranous; lateral nerves 7-10 on either half, sub-parallel, arcuate, impressed above, prominent beneath; base suddenly cuneate in the short petiole; petiole ·3·1 in. long; stipules broad, recurved. *Flowers* orange-coloured. *Calyx* segments ·5··7 in., foliaceous, deciduous, nerves parallel. *Corolla* tube hirsute; lobes orbicular, apiculate; throat villous. *Berry* globose, about ·6 in. across, laxly hairy.

SIBSAGAR, KHASI HILLS, ascending up to 4,000 ft.

Flrs. 8-9. Fr. Cold season.

4. *Mussænda Keenani* Hk. f.

An erect robust undershrub, stem white with a thick coating of cork, which splits longitudinally. *Leaves* 4·9 by 2·5 in., entire, obovate or oblanceolate, abruptly acuminate, subcoriaceous, glabrous; lateral nerves 15-18 on either half, sub-parallel, very prominent underneath; secondary nerves more or less sub-parallel; base narrowed into the petiole or cuneate; petiole ·2·1 in. long, stout. *Flowers* in cymes, about 3 in. across, almost capitate. *Calyx* teeth ·5 in. long,

fine, persistent. *Corolla* nearly 1 in. long. *Berry* succulent, white.

Nongkhlaw-KHASI HILLS; CACHAR (Keenan).

Flrs. 9-10. Fr. Cold weather.

5. *Mussænda incana* Wal!.

An erect undershrub, densely clothed with adpressed hairs. *Leaves* 2-6 by 1-2·8 in., subsessile, entire, elliptic, ovate or oblong, acuminate, subcoriaceous, villous; lateral nerves 10-12 on either half, sunk above; base rounded or acute; petiole ·05-·12 in. long. *Flowers* golden or chrome yellow, in subsessile corymbose cymes. *Calyx* teeth pubescent; enlarged calyx segments foliaceous, pubescent, cream or pale yellow, sub-basal nerved with elegant reticulate venation. *Corolla* ·75 in. long, slender. *Berry* with adpressed hairs and small areole.

Guma Reserve, GOALPARA.

Flrs. 5.

6. *Mussænda Roxburghii* Hk. f. Vern. *Dieng-ja-long-tham*, *Dieng-ja-lai*, Khasi; *Gardek*, Garo; *Bosolangde*, Mik.; *Naolungkanchal*, Lushai; *Chikribiphang*, Mech.; *Soklati*, Ass.; (?) *Imphat-champring*, Mik.

A large erect shrub; stem light brown. *Leaves* 2-5-8 by 1-3-3 in., elliptic to elliptic-lanceolate, entire, acuminate or caudate, membranous, sparsely setulose above, pale beneath, strigose on the midrib beneath and sparsely so between the nerves; lateral nerves 8-12 on either half; base narrowed; petiole stout, ·2-1 in. long; stipules lanceolate. *Flowers* orange, occasionally yellow, in dense corymbose cymes, about 2 in. across. *Calyx* teeth long, persistent, filiform or subulate; stalk of the petaloid calyx segment becomes more or less enlarged and white. *Corolla* tube pale green, very strigose, 1-25-1-5 in. long; lobes ·3 in., orange inside and pale white outside. *Berry* oblong to ellipsoid, crowded in a head-like mass, areolate above with setaceous calyx segments.

KHASI HILLS, LAKHIMPUR, GARO HILLS, SIBSAGAR, N. C. HILLS, LUSHAI HILLS, GOALPARA, DARRANG.

An infusion of the leaves is used for colouring carrying baskets and for binding the wicker work. Leaves are eaten by Mikirs and Khasis as vegetables.

Fls. 6-11. Fr. Cold season.

Specimen No. 6102 appears to be a distinct variety. *Leaves* inflorescence and branchlets very hairy. (It is not uncommon—R. N. De)

Mussænda Treutleri Stapf.

A shrub, branches shortly pubescent. *Leaves* 6-12 by 3-6 in., ovate or elliptic-ovate, entire, acute, sparsely hairy, specially hirsute on the nerves on both sides; lateral nerves 6-8 on either half; base usually shortly cuneate; petiole 6-1·5 in. long; stipules often 2-fid, 3-5 in. long, herbaceous. *Corymbs* many fld. dense, terminal, often with additional cymes on the upper axils; lower bracts broad, sometimes slightly laciniate; upper bracts calyceine. *Calyx-teeth* linear or subulate, much and gradually narrowed, herbaceous, almost glabrous, 3-4 in. long, foliaceous; enlarged segment white. *Corolla* orange, 7-1·25 in. long before opening, adpressed pubescent, almost glabrous on maturity, 5-cornered in bud; lobes 25 in. long, tips cordate, throat hairy. *Berry* globose, dry, 3 in. across, soon glabrescent.

KHASI HILLS (2,000-6,000 ft.). (Bot. Mag. Vol. V. 8,254).

7. Mussænda Parryorum Fischer.

A scandent shrub, branches terete. *Bark* brown or yellowish brown, pubescent at the nodes, more or less lenticellate, young parts tomentose (without lenticel). *Leaves* 3-6 by 2-3 in., elliptic, acuminate; young leaves tomentose, adpressed brownish pubescent on the nerves above in maturity; lateral nerves 7-9 on either half, prominent above, ultimate reticulation very minute; base gradually attenuate; petiole 12-6 in. long, adpressed brownish pubescent; stipules triangular, lanceolate, acuminate, often bifid at the apex, 17-2 in. long. *Flowers* in diffused sessile cyme, branches of which are finely greyish tomentose; bracts 2; bracteoles 3, linear, brown pubescent; pedicels short. *Calyx* 12-17 in. long, tube very short; teeth 5, very rarely 6, linear, brownish pubescent; enlarged foliaceous segment white, elliptic, acute or acuminate, up to 3·3 in. long, and 17 in. broad, 7-nerved towards the base. *Corolla* 1 in. long; buds clavate; tube narrow cylindrical, inflated upwards, greenish grey, somewhat hairy outside, glabrous inside towards the base; lobes 5, patent, suborbicular or reniform, cuspidate, 1 in. long. *Stamens* 5; filaments short;

anthers linear, ·2 in. long. *Ovary* turbinate, ·12·17 in. long, hirsute; style filiform, dilated towards the apex; stigma 2, smooth. *Fruit* baccate, ·3 in. long, black when dry, very finely brown pubescent.

ASSAM, LUSHAI HILLS ascending up to 1,500 ft. (Kew bulletin 1928 No. 6, p. 274. Sheet no. 358 of Mrs. Parry).

8. *Mussænda Pentasemia Fischer.*

A handsome shrub 4·7 ft. high; branches terete brown, pilose; young branches angled, densely villous. *Leaves* 3·6 by 1·5-3 in., sub-equal, elliptic or broadly ovate, acute or acuminate, sub-undulate, finely pilose above, densely pilose below; lateral nerves 9-12 on either side, more or less prominent; secondary nerves transverse, reticulation very fine; base frequently attenuated and more or less decurrent, rarely round; petiole ·2·8 in. long; stipules ovate, ·2·4 in. long, sub-acute, often bifid towards the apex, densely brownish villous. *Cymes* terminal, bracteate, 1·2-2 in. long; rachis villous; bracts upto ·6 in. long, lanceolate, cordate or bifid. *Flowers* sub-sessile. *Calyx* obscure; segments 5; the enlarged segment white, elliptic-lanceolate, acuminate, attenuated towards the base, 1·5-2·5 in. by ·4·6 in., elliptic-oblong or sub-orbicular, cuspidate (upto 4·8 in. long and 2·5 in. broad), setose on both sides. *Corolla* tube narrow-cylindrical, broadened at the top, densely yellowish pilosa, ·8 in. long, brownish yellow; lobes 5, patent, round, ·2·25 in. long, setose outside, glabrous inside. *Stamens* 5; anthers linear, included, flattened, sessile, ·2 in. long. *Ovary* narrow, ·17·2 in. long, densely villous; style filiform; stigma clavate, bifid, smooth. *Fruit* oblong, baccate, ·3·4 in. long, green when dry, smooth. *Seeds* minute, sub-orbicular, compressed; testa black, foveolate.

LUSHAI HILLS ascending 2,150 ft. (Kew bulletin 1928, No. VI, p. 275. Mrs. Parry, 275).

Aeranthera tomentosa Br.

A hirsutely tomentose epiphyte. *Leaves* 4-10 in. long, elliptic or oblanceolate, acute, hirsute. *Flower* bluish in subterminal bracteate cymes. *Calyx* segments linear-lanceolate, ·6-1 in. long. *Corolla* villous; tube funnel-shaped. *Stamens* 5, included. *Ovary*

1-celled, fusiform; style filiform. *Berry* 1·5 in. long with persistent calyx-lobes.

KHASI HILLS; CACHAR (Keenan).
(F.B.I., p. 92, Vol. III).

Polysolenia Wallichii Hk. f.

An erect glabrous undershrub. *Leaves* 3·5 in. long, lanceolate, acuminate, pubescent; nerves slender; base narrowed into a petiole, ·25·1 in. long; stipules ·3·5 in. long. *Flowers* in solitary terminal peduncled heads. *Calyx-tube* short; segments 5, broadly ova.e. *Corolla* pubescent, 1·1·25 in. long. *Ovary* 2-celled; style filiform; stigma short, dilated; ovules many, placenta peltate.

KHASI HILLS; CACHAR (Keenan)
(F.B.I., p. 94, Vol. III).

19. MYCETIA Reinw.

Mycetia longifolia O. ktze. Syn. *M. javanica* Reinw==
Adenosacme longifolia Wall.

An undershrub or small shrub; stem greyish-yellow; branches rigid, bristly. *Leaves* 3-10·5 by ·8·3·3 in., entire, margins sparsely ciliate, elliptic to obovate-lanceolate, acute, often caudate-acuminate, membranous, more or less pubescent, mainly on the underside; base narrowed into a slender petiole; petiole puberulous, ·2·1 in. long; stipules small, membranous, lanceolate, oblong, ·3·5 in. long. *Flowers* yellowish, in compound trichotomous zigzagly branched sub-terminal cymes, dimorphic (*a*) short-styled; anthers inserted at the base of the corolla tube, (*b*) long-styled; anthers inserter on the mouth of the corolla tube. *Calyx-tube* hemispheric or sub-globose, not produced beyond the ovary; teeth 4-6, lanceolate, persistent, sinus glandular. *Corolla* tube campanulate, fleshy; lobes small, 4-6, valvate in bud with everted edges. *Stamens* 4-6; filaments short; anthers linear, oblong. *Ovary* 2-celled; style short; stigmas 2. *Berries* globose, broader than long, ·25 in. across, fleshy, spongy and snow-white, crowned with the membranous calyx-teeth. *Seeds* many, black, angled or minute, compressed, rugose: juice sweetish; embryo minute; albumen fleshy.

NAGA HILLS, LUSHAI HILLS, NOWGONG, KHASI HILLS,
ascending up to 5,000 ft.

Fls. 10-11. Fr. cold season.

20. MYRIONEURON Wall.

Myrioneuron nutans Wall.

A small shrub, sometimes climbing (Brandis); branches stout, old stem white with soft corky bark. *Leaves* 5-9 by 2·5-5 in., obovate-elliptic, acuminate, sub-coriaceous, glabrous above, subscabrid beneath, specially along the nerves; lateral nerves 15-20 on either half, arched and anastomosing at the extremity; tertiaries also strong, transverse to the secondary; quarternaries also conspicuous and form a fine pattern; stipules erect, oblong-lanceolate, about 1 in. by 2 in. *Flowers* white (fading into dull yellow), in dense pedunculate bracteate corymbose cymes from the axils of the uppermost leaf. *Bracts* rigid, lanceolate. *Calyx* teeth subulate, exceeding the corolla, persistent. *Corolla* tubular; lobes short, erect, hispid, valvate in bud; throat villous. *Stamens* 5, adnate to the corolla-tube; filaments short, subulate; anthers linear; included. *Ovary* 2-celled; style short; stigma 2, linear-oblong, cohering. *Berries* white, about 1·5 in. across, globose, crowned by the scarious calyx-teeth, many seeded. *Seeds* black, minute, angular; testa pitted; albumen fleshy.

N. E. FRONTIER TRACT, CACHAR, SYLHET, KHASI HILLS, GOALPARA, CENTRAL ASSAM.

Flrs. 10-12. Fr. 12-2.

Keenania modesta Hook. f.

A low sub-herbaceous herb. *Leaves* 6-12 by 1·5-3 in., opposite, elongate-lanceolate, abruptly acuminate, membranous, puberulous beneath; lateral nerves 15-20 on either half; base narrowed into the petiole 75-1 in. long; stipules 5-1 in. long. *Heads* globose, nodding, 1 in. across. *Calyx* 3 in. long. *Corolla* tube inflated, glabrous, throat with a ring of stiff hairs. *Ovary* 2-celled; style short; stigmas 2, flat; ovules 8.

CACHAR (Keenan)
(F.B.I., p. 101, Vol. III).

21. WEBERA Schreb. (Tarenna Gaertn.)

Trees or shrubs. *Leaves* usually drying black; stipules triangular-ovate, usually deciduous. *Flowers* bracteolate,

sessile or pedicellate, usually pentamerous, in terminal corymbose compound cymes. *Calyx-tube* ovoid or turbinate; limb 5-fid, rarely 4, produced beyond the ovary. *Corolla* funnel-shaped; throat glabrous or pubescent; lobes 5, rarely 4, contorted. *Stamens* 5, rarely 4 on the throat or mouth of the corolla; filaments short or 0; anthers slender, exserted. *Ovary* 2-celled; style stout, usually pubescent; stigma stout, fusiform, grooved, usually exserted; ovules usually numerous, rarely few or solitary, often immersed in the fleshy peltate placenta. *Berry* small, globose. *Seeds* plano-convex or cup-shaped; embryo small; albumen fleshy or horny; cotyledons foliaceous.

I. Ovules 2 or more in each cell :—

Corolla glabrous without :—

Berries ultimately black, leaves coriaceous.

1. *W. corymbosa*.

Corolla hairy outside :—

Corolla-tube shorter than the lobes.

Leaves membranous :—

Leaves black when dry. Berries many-seeded.

2. *W. odorata*.

Leaves olive-brown when dry. Berries 2-seeded.

3. *W. disperma*.

Corolla-tube equalling the lobes :—

Leaves rigidly coriaceous.

4. *W. pumila*.

II. Ovules solitary in each cell :—

Corolla throat villous; lateral nerves 8-10 on either half. Corolla funnel-shaped. . .

5. *W. Kurzii*.

Corolla throat glabrous; lateral nerves 12-15 on either half. Corolla campanulate.

6. *W. campaniflora*.

1. *Webera corymbosa* Willd. *Tarenna asiatica* O. ktze (modern name).

A large evergreen shrub or small tree. *Bark* greyish-brown with very thin cuticle, inside greenish white, leathery, 12 in. thick; young shoots often covered with resinous excrescence. *Leaves* 3-6 by 1-2 in., elliptic or oblong, lanceolate, entire, coriaceous, apex acute or acuminate, glossy, shining above, often glaucous beneath; lateral nerves 6-10 on either half, abruptly turned upwards at the margin; base acute; petiole 1-5 in. long, stout; stipules

coriaceous, triangular from a broad base, subpersistent. *Flowers* white, fragrant, in terminal trichotomous compound sparsely hirsute cymes. *Calyx* ·12 in. long, sparsely pubescent; teeth triangular, ciliate. *Corolla* ·4 in. long in the bud; tube pubescent; lobes sub-acute, villous at the mouth, twisted to the left. *Berries* ultimately black, the size of a pea, crowned by the calyx which often becomes deciduous leaving a conspicuous scar. *Seeds* 6-10, shaped like orange segments; albumen horny; embryo cells pitted with oil.

N. C. HILLS (above Jatinga).

Flrs. 4-6. Fr. 8-1.

2. Webera odorata Roxb.—*Tarenna odorata* Robens (modern name) Vern. *Vokmit*, *Parmathim*, Lushai.

A shrub or small tree. *Bark* grey; blaze light pink. *Leaves* black when dry, 2·5-9 by 1·2-5 in., elliptic-lanceolate, entire, acuminate, membranous, glabrous; lateral nerves 6-9 on either half, ascending; base acute; petiole ·2·6 in. long; stipules deciduous. *Flowers* pedicellate, in corymbiform pubescent cymes; bracts linear. *Calyx* minutely toothed. *Corolla* tube ·25 in. long, slender, shorter than the lobes. *Ovules* few, size of a pea (Roxb.).

LUSHAI HILLS, MANIPUR (Clarke), KHASI HILLS, ascending up to 4,000 ft.

Flrs. 9-10. Fr. Cold season.

3. Webera disperma Hk. f.

A shrub or a small tree. *Leaves* 3·5-5 by ·8-2 in., olive-brown when dry, elliptic or lanceolate, entire, acuminate, membranous, glabrous; lateral nerves 10-11 on either half; base acute; petiole ·2·6 in. long; stipules lanceolate. *Flowers* in shortly peduncled pubescent cymes. *Calyx* obtusely toothed. *Corolla* tube broad, pubescent, shorter than the lobes. *Ovary* with 2 ovules in each cell. *Berries* 2-seeded.

SIBSAGAR (Barpathar) Nambor Forests (Mann); KHASI HILLS (Mann)—ascending up to 4,000 ft.

Flrs. 2-5. Fr. Cold season.

4. Webera pumila Hk. f.

A dwarf bushy shrub with stout branches growing near edges of streams; stem greyish brown. *Leaves* sub-sessile, .8-3 by .15-.4 in., narrow spatulate or lanceolate, often oblique, entire, recurved apiculate, rigidly coriaceous; lateral nerves about 5 on either half, obscure; petiole very short; stipules tailed, pubescent. *Flowers* white, .6-.8 in. long, in small subcapitellate terminal hirsute cymes; buds club-shaped. *Calyx* teeth minute. *Corolla* tube and lobes about .25 in. long. *Ovary* cells 3-5 ovuled. *Berries* size of a small pea, globose, .2 in across. *Seeds* angled.

Gauhati (Kurz), N. C. HILLS (Dehingi bank), KHASI HILLS (Barpani River)—ascending up to 2,000 ft.

Flrs. 1-2. Fr. 9-10, or both throughout the year.

5. Webera Kurzii Hk. f.

A shrub or small evergreen tree. *Leaves* 5-8 by 1.5-2.5 in., elliptic or obovate-lanceolate, entire, acuminate, membranous, glabrous above, pubescent beneath; lateral nerves 8-10 on either half; base acute; petiole .3-.5 in. long. *Flowers* white, ebracteate, pedicellate, in sessile or almost sessile trichotomous terminal cyme. *Calyx* teeth triangular, obtuse. *Corolla* glabrous outside; throat villous; lobes longer than the tube. *One ovule* in each cell of the ovary. *Seeds* deeply excavated centrally; testa coriaceous.

(Garampani) SIBSAGAR (U. Kanjilal).

Flrs. 4 (Burmah). Fr. Cold season.

6. Webera campaniflora Hk. f.

A shrub. *Leaves* 3-5.5 by 1.2-3 in., almost black when dry, elliptic or elliptic-lanceolate, entire, shortly acuminate, glabrous above, pubescent or puberulous beneath; lateral nerves 12-15 on either half; base acute, occasionally rounded or obtuse; petiole .3-.7 in. long; stipules deciduous, cuspidate. *Flowers* pedicellate (Assam form), in terminal corymbose cymes; bracteoles 2 on each pedicel. *Calyx* hirsute; teeth larger than ovary. *Corolla* .6 in. long with a short villous tube, spreading into a large campanulate limb; throat glabrous. *Anthers* long, sessile. *Style* short, hairy;

stigma long, fusiform; one ovule in each cell of the ovary.
Fruit globose.

Phulerlal (CACHAR).

Flrs. 8-9. Fr. Cold season.

Webera Schreb is now combined with the genus *Tarenna* Gærtn. *T. asiatica* O. Ktze, and *T. odorata* Robins are modern names for *W. corymbosa* Willd and *W. odorata* Roxb. The combinations for the remaining species appear not to have been made so far.

22. BRACHYTOME Hook. f.

Brachytome Wallichii Hk. f.

A shrub or small tree 20-25 ft. high; branches terete. *Leaves* 4-9 by 1-2 in., entire, oblong-ovate, lanceolate, caudate-acuminate, membranous, glabrous or hoary above, inconspicuously puberulous beneath; lateral nerves 7-12 on either half, slender; base acute; petiole 2-6 in. long; stipules triangular, persistent. *Flowers* rather small in polygamodioecious irregularly branched compound cymes from the axils of the uppermost leaves. *Calyx-tube* oblong; limb cup-shaped; teeth 5, persistent. *Corolla* funnel-shaped; lobes 5, short, twisted in bud. *Stamens* 5, inserted on the corolla throat; anthers subsessile, included, linear-oblong, imperfect in female flower. *Disk* in female flower small, in male flower cupular. *Ovary* 2-celled; style filiform; stigmas 2; ovules numerous. *Berries* small, ellipsoid, 2-celled, many seeded, crowned with the calyx limb. *Seeds* crowned, cuneate, compressed; testa thin, reticulate; albumen fleshy.

KHASI HILLS, 3-4,000 ft.

Flrs. 3-4. Fr. 10-11.

23. GARDENIA Linn.

Gardenia campanulata Roxb. Vern. *Gandaphaji*, Mech; *Darichik*, *Rukhawak*, Garo; *Bitmara*, *Dhubiu-khola*, Ass.; *Dieng-chhi*, *Dieng-soh-lah-kaskei*, *Soh-mai*, Khasi; *Biolem*, Sylh.; *Lam-lei-bi*, Manip.

A large shrub or a small tree armed with spinescent abortive branches. *Bark* greyish smooth, inside greenish grey.

Shoots puberulous. *Leaves* opposite or ternate, 1·4 by 1·5-1·8 in., elliptic-ovate or oblanceolate, entire, bluntly acute or acuminate, coriaceous, glabrous; lateral nerves 5-6 on either half, inconspicuous; midrib slender; base narrowed into a short petiole; petiole 2·6 in. long; stipules intrapetiolar, free, triangular, deciduous. *Flowers* dimorphic, male flowers (with sterile ovary) fascicled; bisexual flowers sessile, solitary; buds not resinous. *Calyx* of male flower 3 in., urn-shaped; mouth truncate, dilated; of bisexual flower-limb campanulate, segments contorted. *Corolla* campanulate; tube 25·3 in.; lobes short, obtuse. *Stamens* as many as corolla lobes; anthers included, sessile or nearly so. *Ovary* 1-celled; style stout; stigma green, deeply 5-lobed; placenta 2-6, parietal; ovules numerous. *Fruit* not beaked, ellipsoid or subglobose, obscurely 5 ridged with fleshy pericarp. *Seeds* numerous, compressed, embedded in the placenta; testa thin, albumen horny; embryo minute.

GOALPARA, GARO HILLS, KAMRUP, SIBSAGAR, LAKHIMPUR, N.E. F. TRACT, SYLHET, CACHAR, DARRANG and KHASI HILLS ascending up to 1,200 ft.

Leaves and fruits are eaten cooked. Boiled fruit is used for washing purposes.

Flrs. 3-4. Fr. 10-11.

Gardenia coronaria Ham.

A deciduous tree or large shrub; buds resinous. *Bark* greyish, splitting in small cylindrical pieces enclosing the branchlets on drying. *Leaves* 3-7 by 1·5-3 in., entire, obscurely crenate towards the apex, obovate, acuminate, glabrous; base narrowed into a short petiole; stipules connate; lateral nerves quite conspicuous underneath, 11-13 on either half, arcuate at the margin. *Flowers* solitary, axillary. *Calyx-tube* upto 1·2 in., often split on one side upto the middle. *Corolla* white, fragrant; tube upto 3 in. long; lobes 5. *Fruit* ellipsoid, ribbed, about 1·2 by ·6 in.

SYLHET (13,927 and 13,928).

Flrs. & Fr. (Mature) 5.

Gardenia turgida Roxb.

A small deciduous tree, armed with strong axillary often leaf bearing spines; bark smooth, bluish or pale grey. *Leaves* often crowded on dwarf shoots, 1-4 in. long, obovate, elliptic, obtuse or bluntly acuminate, coriaceous, tomentose beneath, sessile or narrowed into a short decurrent petiole; stipules distinct, caducous. *Flowers*

fragrant, polygamous, solitary or fascicled (upto 4). *Calyx* sub-truncate. *Corolla* white; tube 3-5 in. long, slightly dilated upwards; lobes oblong, longer than the tube. *Stamens* as many as costa lobes; anthers sessile. *Ovary* 1-celled; ovules numerous on persistent placenta. *Fruit* globose, 1-3 in. across, mealy outside.

SYLHET (F. B. I. P. 118, Vol. III).

The fruit is said to be eaten cooked.

Frs. 3-5. Fr. Cold season.

24. RANDIA Linn.

Small trees or shrubs, unarmed or spinous. The spines usually in opposite pairs axillary to the branchlets. *Leaves* often fascicled on arrested branchlets or opposite with one of the pair often arrested; stipules intrapetiolar, short, free or connate. *Flowers* often dimorphic, white or yellowish, large or small, solitary or fascicled or in axillary or leaf opposed cymes. *Calyx*: tube ovoid or turbinate; limb often tubular; segments 5. *Corolla* campanulate, funnel-shaped or salver-shaped; tube long or short, usually with a ring of hairs within; lobes usually 5, twisted to the left. *Stamens* 5; anthers sub-sessile. *Ovary* generally 2-celled; ovules usually numerous, sunk in fleshy placentas; style slender; stigma fusiform, entire or bifid. *Fruit* a globose, ovoid or ellipsoid, 2 celled, many seeded berry. *Seeds* angular, often embedded in pulp; albumen horny.

Armed :—

Leaves glabrous :—

Fruit 3 in. long, 4-seeded. A shrub. 1. *R. tetrasperma*.

Fruit 1-2 in. long, many seeded, purple; spines decussate, short at the ends of arrested branchlets. A small tree.

2. *R. uliginosa*.

Fruit 3-5 in. long; spines short, recurved. Leaves coriaceous. A rambling shrub.

3. *R. longiflora*.

Fruit 3 in. long; spines short, straight or wanting; leaves membranous. A shrub.

4. *R. griffithii*.

Leaves pubescent or tomentose :—

Flowers usually solitary; berries about 1-5 in. long, yellow when ripe.

5. *R. dumetorum*.

Flowers in cymes or fascicles; berries small, 2-3 in. long, purple

6. *R. fasciculata*.

Unarmed :—

Calyx-teeth minute. Corolla less than 1 in. :—

Flowers white. Corolla 6-8 in. across. Berry 3 in. A middle sized tree. 7. *R. densiflora*.

Flowers yellow. Corolla 5 in. long. A small tree or shrub. 8. *R. Wallichii*.

1. *Randia tetrasperma* Roxb.

A small erect rigid shrub with stiff branches and branchlets. Bark brown, fairly smooth, exfoliating in rather thick irregular scales. Branches subspinescent. Leaves variable, approximate at the ends of arrested branchlets, 5-2 by 15-6 in., obovate to oblanceolate, glabrous, narrowed into a short petiole; stipules small, acute or acuminate. Flowers pentamerous, sessile, fragrant, greenish white, solitary. Calyx-tube turbinate; segment subulate with deltoid bases. Corolla-tube 3 in. long; lobes oblong. Anthers exserted. Stigma fusiform. Berry globose, 25-35 in. across, purple, tipped with persistent clayx segments.

SYLHET (Hooker).

Flrs. 4-6. Fr. Cold season.

2. *Randia uliginosa* DC. Vern. Bon-Bongana, Ass.; Agendra, Suskeng, Garo; Pirala, Beng.; Kendu, Jharua; Chehepi-arong, Chehepi, Mik.; Bonaphi-phang, Kach.; Thing-pui, Kuki.

A small rigid deciduous tree. Bark reddish-brown with horizontal cracks; branchlets quadrangular, pubescent when young; spines decussate at the ends of arrested branchlets. Leaves 2-3 by 1-3-5 in., often crowded at the ends of branchlets, obovate or obovate to oblong, shining above, often pubescent along the nerves beneath; lateral nerves 6-8 on either half; base cuneate; petiole 3 in. long; stipules triangular. Flowers white, solitary, 1-2 in. across, dimorphic, peduncled and small or sub-sessile and large. Calyx-tube 5-1 in. long; segments rounded. Corolla spreading; tube usually short; lobes 5-7, rounded. Stamens 5-7, sessile; the large (sub-sessile) form with a ring of hairs at the throat of the corolla tube and bi-lobed stigma, the

smaller form (functionally male) with a very short corolla tube glabrous within and undivided stigma. *Fruit* about 2 in. across and crowned with the persistent calyx segments, 2 celled.

NOWGONG, DARRANG, GARO HILLS, N. C. HILLS, GOALPARA.

The fruit is eaten and the leaves are browsed by deer and cattle.
Flrs. 5-6. Fr. Cold season.

3. Randia longiflora Lamk. Vern. *Pulikaint, Borokiamkora*, Ass.; *Subekbekarikang, Popung-rikang, Yang-tarlong*, Mik.; *Rhuibaikoy, Lushai; Bechuk*, Tipp.; *Silanasugur*, Mech; *Jermei-siatiew-krot, Mei-sia*, Khasi; *Bairauathi-doukha*, Kach.; *Yengokjaching*, Garo.

A large rambling and climbing glabrous shrub. *Bark* grey, smooth, light red with brown streaks inside; thorns recurved. *Leaves* 2-3 by 3-4 in., ovate-elliptic or oblong, entire, abruptly acute, coriaceous, glabrous; lateral nerves 5-6 on either half, occasionally glandular at the nerve-axils; base cuneate; petiole 2-3 in. long; stipules triangular with a broad base. *Flowers* puberulous, white, fragrant, in axillary or leaf opposed shortly peduncled trichotomous cymes (often from alternate axils of reduced leaves). *Calyx* tube dilated; segments triangular. *Corolla* tube much longer than the lobes. *Stigma* bifid. *Berry* obscurely ribbed, 3-5 in. long, black when ripe, about 8 seeded; albumen ruminata.

LUSHAI HILLS, SIBSAGAR, NOWGONG, SYLHET, CACHAR, GOALPARA, GARO HILLS, N. C. HILLS.

Wood cream colour.

Flrs. 10-11. Fr. 12-1.

4. Randia griffithii Hk. f. Vern. *Dieng-soh-ladung*, Synt.

An erect shrub or small tree with straggling branches; branchlets marked with prominent hairy ridges indicating the nodes. *Bark* greenish-grey, dark-green underneath the very thin corky layer, 1 in. thick; spines ascending. *Leaves* 2-5 by 5-1-5 in., ovate or ovate-lanceolate, acuminate, entire, membranous or thinly coriaceous, glabrous, shining; lateral nerves 6-8 on either half; base acute; petiole 1-4 in. long,

margined; stipules subulate. *Flowers* 5-merous in few flowered, sub-sessile terminal cymes; bracts connate. *Calyx* ·25 in. long, funnel-shaped; limb dilated, minutely toothed, deciduous. *Corolla* tube short; lobes elliptic, ·4·5 in. long. *Ovary* stipitate, lengthening in fruit. *Berries* black, 2-celled, 2-4 seeded, globose, ·25·35 in. across.

KHASI HILLS.

Flrs. 5-7. Fr. 10.

5. Randia dumetorum Lamk. Vern. *Behmona*, Mon, Ass.; *Ruthi*, *Ruthi-arong*, Mik.; *Rupanthou*, *Rithai-phang*, *Monraling*, Kuki; *Biskhanthokra*, Mech; *Dieng-makasing-khlaw*, Kh.; *Kotoh-bih*, Darrang; *Biolom*, Sylh.; *Buro-mayna*, Mech; *Thiskeng*, Garo.

A large deciduous shrub or sometimes a small tree with stout axillary spines. *Bark* dark-brown or grey, somewhat rough. *Leaves* 1·3·5 by ·8·1·5 in., generally fascicled on arrested branchlets, obovate or oblanceolate, roundish or obtusely short, acuminate or acute, pubescent, rough or glabrous; lateral nerves 5-7 on either half, sub-parallel; base narrowed into a short marginate petiole; petiole ·1·4 in. long; stipules ovate, acuminate. *Flowers* sub-sessile, ·7·1 in. across, greenish white or yellowish, fragrant, solitary or 2-3 together on short lateral branchlets. *Calyx* strigose; tube ·2·3 in. long, campanulate; segments variable, ovate or lanceolate or spatulate, foliaceous, as long as the tube. *Corolla* covered with adpressed silky hairs; tube not exceeding the calyx; lobes spreading, oval or oblong. *Stigma* fusiform. *Berry* soft, fleshy, ·1·1·5 in. long, globose or ovoid, yellow when ripe, usually tipped with persistent calyx. *Seeds* compressed, imbedded in a gelatinous pulp.

GOALPARA, NOWGONG, GARO HILLS, KAMRUP, N. C. HILLS, KHASI HILLS, DARRANG.

Fruit used for poisoning fish and is considered to be one of the best and safest emetics in Indian medicine.

Flrs. 4-5. Fr. Cold season.

6. Randia fasciculata DC. Vern. *Horu-moyan*, *Pulikaint*, Ass.; *Suhō*, Mik.

A handsome spreading shrub or a small tree with short axillary spines; branchlets pubescent. *Bark* greenish-grey,

warty, ·16 in. thick, having minute vertical lines, green below the cuticle. *Leaves* 1·8 by ·43 in., oblong-lanceolate, elliptic or ovate, acute or acuminate, entire, membranous, dark-green and shining, glabrous; lateral nerves 9-11 on either half, usually rounded at the base; petiole ·2·8 in. long; stipules narrow, lanceolate. *Flowers* white, fragrant, bracteate, 1 in. across, usually in 3-flowered cymes at the ends of branchlets, sometimes axillary and fasciculate. *Calyx* pubescent; teeth linear, deciduous. *Corolla* tube slender; lobes broad, oblong, often apiculate, hairy at the base. *Anthers* sub-sessile at the mouth of the corolla-tube. *Stigma* slightly exserted, fusiform. *Berry* purplish black when ripe, globose, ·25 in. across with 10-12 angular seeds.

KHASI HILLS, LAKHIMPUR, CACHAR, NOWGONG, KAMRUP, N. C. HILLS.

Wood cream colour.

Flrs. 3-5. Fr. Cold season.

7. *Randia densiflora* Benth. Vern. *Dieng-iong-blei*, Khasi; *Parsaru*, Kuki.

A tree (60'/45"). *Bark* greyish-brown, smooth, with distant slender horizontal wrinkles, green beneath the cork; mattedly fibrous and reddish-brown inside, soft near cambium, soon turning darkish-brown. *Branchlets* opposite, quadrangular. *Leaves* 2·5-7 by ·6-3 in., bifarious, entire, smooth, elliptic-oblong or lanceolate, acuminate, coriaceous; lateral nerves 5-7 on either half; base acute; petiole ·2·5 in. long; stipules triangular, acuminate, deciduous. *Flowers* 5 merous, subsessile, pale yellow, ·6-8 in. across, in much branched leaf opposed scorpioid cymes; bracts persistent. *Calyx* bowl-shaped; teeth triangular, acute. *Corolla* tube ·16 in. long; lobes linear-oblong, twisted to the right in bud; throat hairy. *Anthers* ·25-3 in. long, radiating from angles of corolla lobes. *Stigma* exserted.

CACHAR, SIBSAGAR, KHASI HILLS, MIKIR HILLS.

Flrs. 12-2. Fr. not seen.

8. *Randia Wallichii* Hk. f. Vern. *Supin-um-soh-arong*, Mik.; *Ching-kabak*, Naga; *Buleng*, *Saphut*, Kuki; *Shundi* (?)

* Fruit-August, a berry, ·1 in. across. Collected from Desoi reserve. Sibsagar Divn.—R. N. De.

Cach.; *Dieng-soh-lakhai-shree*, Khasi; *Dieng-sa-sling-khni*, Synt.; *Theng-okri*, Mik.; *Teslem-phang*, Kach.

A tree (up to 50'/24"). *Branches* flexuous. *Bark* greyish to blackish-brown, exfoliating in irregular flakes, 12-25 in. thick; inside light brown, irregularly mottled and granular. *Leaves* 2-10.5 by 5-2.8 in., elliptic, lanceolate, long acuminate, entire, coriaceous, shining above, slightly pubescent beneath, with scattered glandular pits; lateral nerves 10-12 on either half; base narrowed into the petiole (2-1 in. long); stipules sessile, coriaceous, enclosing buds, caducous. *Flowers* yellowish, fragrant, in leaf opposed or axillary cymes; branches spreading. *Calyx* turbinate; teeth small. *Corolla* 5 in. across, salver-shaped with slender tube, much shorter than the lobes. *Anthers* in the sinuses of the corolla lobes. *Stigma* entire. *Berries* globose, often speckled with white lenticels, many seeded. *Seeds* peltate; cotyledons small, flat, rounded.

KHASI HILLS, N. C. HILLS, CACHAR, NOWGONG.

Wood cream colour, much prized in Cachar.

Flrs. 5. Fr. Cold weather.

25. HYPTIANTHERA W. & A.

Hyptianthera stricta W. & A. Vern. *Boldiki*, Garo; *Tanharu-bom-phang*, Mech; *Thingsairangal*, Lushai.

An aromatic evergreen shrub or small tree; stem brown, reticulately fissured; branches thin, 4-angled or somewhat compressed. *Leaves* decussate, 2-7 by 7-2 in., narrow-elliptic, oblong or linear-lanceolate, entire, somewhat slightly undulate, finely caudate-acuminate, glabrous and shining above, pubescent on nerves beneath when young; lateral nerves 6-7 on either half; base rounded or cuneate; petiole 15.5 in. long; stipules caudate-acuminate, persistent. *Flowers* about 15 in. long, sessile, in dense axillary cymes; bracts minute, lanceolate, acute, ciliate. *Calyx* with a short tube; teeth ovate, acute, hairy inside. *Corolla* shorter than the calyx, tubular; lobes 4-5, twisted. *Anthers* 4-5, sessile, inserted by the back. *Disk* epigynous, annular, pulvinate. *Ovary* 2-celled, with 4-10 pendulous ovules in each cell; style solitary; stigma bifid, white, brush-like. *Berries* 3 in.

long, more or less globose, crowned by the persistent calyx, black when ripe, juicy. Seeds angled and compressed; testa fibrous and plaited; embryo small.

GARO HILLS, DARRANG, SYLHET, LUSHAI HILLS, GOALPARA and KHASI HILLS (Hooker).

Frs. 2-3. Fr. 4-5.

26. TRICALYSIA A. Rich.

Tricalysia singularis K. Schum. Syn. *Diplospora singularis* Korth. Vern. *Pondonje-bephang*, *Kehobai-arong*, Mik.; *Thing-sai*, Lush.; *Thingsai-ranga*, Kuki; *Sairangal*, Tipp.; *Gongar-samphet*, Mech; *Khukru*, *Garo-khukru*, *Kakoi-chira*, Ass.; *Bol-khung-khang*, *Boljakingsok*, Garo.

A tree 50'/48" (90 to 100 ft., *Prazer in Cachar*) with resinous fluted stem and narrow crown. Bark smooth, greyish-brown; old bark peeling off in pieces easily, having fine vertical fissures; blaze pale or greenish-brown, darkening on exposure; old leaves bright yellow. Leaves bifarious, 3-7 by 1-2·5 in., oblong or elliptic-oblong, entire, acuminate, coriaceous, shining above, pale beneath; lateral nerves 6-9 on either half, slender; axil often gland pitted; base cuneate or acute; petiole 2·5 in. long; stipules long acuminate, triangular. Flowers 4-merous, greenish-white, sub-sessile, about .6 in. across, often polygamous, supported by connate bracts, in shortly peduncled cymes mostly from the leaf scars consisting of 4 groups of 3 flowers and a terminal one. Calyx teeth enlarging after flowering. Corolla green, salver-shaped; lobes 4-5, linear-oblong, throat villous. Stamens on the mouth of the corolla tube; filaments short; anthers linear, exserted. Ovary 2-celled; stigma spatulate. Fruit baccate, cherry-like, .7-.8 in. across, purplish black when ripe, crowned by the persistent calyx-limb. Seeds flattened, imbricated, 4-7.

SIBSAGAR, NOWGONG, LUSHAI HILLS, CACHAR, SYLHET, GOALPARA, GARO HILLS, KAMRUP and N. C. HILLS ascending up to 4,000 ft.

Wood white, compact. Used for posts.

Frs. 4-5. Fr. Cold season (persists long on the tree).

27. KNOXIA Linn.

Knoxia corymbosa Willd. Vern. *lang-haik*, Khasi.

An erect slender annual herb; stem obscurely angled. *Leaves* 1·5-5 by ·5-1 in., lanceolate or linear-lanceolate, acuminate, grey pubescent; lateral nerves 7-9 on either half, ascending, very slender; base narrowed into the short petiole (·1-·3 in. long); stipules connate with the petiole into a bristly sheath. *Flowers* 4-merous, light purple, dimorphous, in spicately corymbose lax cymes. *Calyx-segments* equal or nearly equal, one slightly longer; tube persistent. *Corolla* throat villous. *Carpels* connate into a 2-celled ovary; style filiform; stigma 2 lobed; ovules pendulous, solitary in each cell. *Fruit* 4-angled of 2 separating cocci, ripe fruit separating from the persistent columella by a basal perforation. *Seeds* with membranous testa; albumen fleshy; cotyledons very small; radicle superior.

KHASI HILLS ascending up to 4,000 ft.

Flrs. 10. Fr. Cold season.

Octotropis terminalis C. B. Clarke.

A glabrous shrub; branches quadrangular. *Leaves* petiolate, lanceolate or elliptic, narrowed at both ends; stipules short, persistent, subulate. *Cymes* fasciculate in the axils of the uppermost leaves. *Calyx* margins entire. *Corolla* white; tube narrowly cylindric, ·75 in. long; lobes 5, imbricate. *Anthers* 5, oblong, included in the corolla tube. *Stigma* oblong, subentire, exserted. *Ovary* 2-locular. *Ovule* solitary; the septum which divides the ovary in two cells is exceedingly thin, and probably fails altogether. There is certainly no placental thickening near the centre of the ovary and the ovules are attached near its summit.

SIBSAGAR (Nambor forests), NAGA HILLS (No. 40812).

C. B. Clarke Journ. Linn. Soc. XXV. 33, t. 17.

28. CANTHIUM Lam.

Shrubs or small trees, armed or unarmed, erect or climbing. *Leaves* with nerve axils often glandular; stipules connate. *Flowers* small, white or greenish, sometimes polygamous, in axillary fascicles or peduncled corymbose cymes. *Calyx-tube* shortly produced beyond ovary, 4-5 toothed, persistent or deciduous. *Corolla* tube urceolate, campanulate, funnel-shaped or globose with a ring of deflexed hairs within; throat villous; lobes small, 4-5, valvate, at length

reflexed. *Anthers* 4-5, sub-sessile on the throat or mouth of the corolla. *Ovary* 2-celled; style short; stigma large, usually ribbed; ovules pendulous, solitary in each cell. *Drupe* sub-globose or didymous, with 2 pyrenes or 2-celled putamen or 1-celled from abortion. reniform or oblong. *Seeds* oblong; testa membranous; albumen fleshy; embryo elongated with short cotyledons.

Unarmed; flowers pentamerous :—

Leaves coriaceous. Corolla tube campanulate. Pyrenes more or less tubercled. 1. *C. dioecum*.

Leaves thinly coriaceous. Corolla tube sub-globose. Pyrenes quite smooth. 2. *C. glabrum*.

Unarmed; flowers tetramerous :—

Leaves membranous. 3. *C. gracilipes*.

Armed; flowers pentamerous :—

Leaves glabrous and glossy. 4. *C. angustifolium*.

Leaves pubescent. 5. *C. parvifolium*.

1. *Canthium dioecum* Merr.=*C. didymum* Roxb.

A low branched tree 55'/60" or a stout large evergreen shrub with spreading or drooping branchlets which are flattened at the upper extremities, unarmed. *Bark* dark-grey, brittle with vertical cracks, often warty; inside light brown, coarsely mottled with thick deep brown strands; turning dark-brown. *Leaves* bifarious, variable, 3-6 by 1-3 in., entire, elliptic or ovate-lanceolate, abruptly acuminate, coriaceous, quite glabrous, glossy; lateral nerves 3-6 on either half; nerve axils gland pitted; base rounded or cuneate, often unequal; petiole 3-5 in. long; stipules variable, long-cuspidate. *Flowers* 5-merous, white, fragrant, in dense axillary often umbellate cymes sessile or shortly peduncled. *Calyx* truncate or obscurely toothed. *Corolla* tube campanulate; lobes lanceolate, rotate, reflexed. *Stamens* on mouth of corolla; filaments short. *Style* long; stigma mitriform. *Fruit* globose, blackish or purple, slightly longer than broad. *Pyrenes* more or less wrinkled or tubercled, rounded on the back.

SYLHET, N. C. HILLS (Jatinga); KHASI HILLS.

Wood hard, close and even grained, used to some extent for handles of implements. Gamble says that it has a great resemblance to box wood.

Flrs. 12-3. Fr. 5-8.

2. *Canthium glabrum* Bl. Vern. *Bon-theregu*, Sib-sagar, *Ticho-okran-arong*, *Jhenemuiarong*, Mik.; *Bathling*, Lush.; *Bolthinking*, Garo; *Ramnisethar*, Kuki; *Bogakalti*, *Bhela*, Ass.; *Longam-chhang*, Naga; *Dieng-ri-sai*, Khasi.

A middle sized tree (50'/57''), irregularly fluted, unarmed. *Branchlets* decussate and irregularly fluted; old leaves yellow. *Bark* deep-brown with white patches, corky outside, fibrous, brown and pale inside; blaze striated, red and yellow, turning dirty. *Leaves* 4-7 by 1·5-3 in., bifarious, entire, elliptic, ovate-oblong or oblong-lanceolate, obtuse to abruptly acuminate, thinly coriaceous, glabrous, glossy-green above, paler beneath; lateral nerves 5-7 on either half; nerve axils occasionally gland pitted; tertiary nerves obconic; base rounded or cuneate; petiole 2·5 in. long; stipules with broad base, subulate. *Flowers* pentamerous, in shortly peduncled glabrous rather lax cymes. *Calyx* glabrous, about 5 in. long. *Corolla* tube sub-globose; lobes as long, spreading. *Stigma* mitriform, notched. *Fruit* globose; pyrenes quite smooth, triangular, almost keeled; pericarp fleshy, granular.

SIBSAGAR, LUSHAI HILLS, CACHAR, SYLHET, DARRANG, GOALPARA, GARO HILLS, KAMRUP & KHASI HILLS.

Wood yellowish white, very hard, compact.

Fls. 7-10. Fr. 1-3.

3. *Canthium gracilipes* Kurz.

A scrambling shrub; young branchlets pubescent. *Leaves* 1-3 by 5-1·8 in., entire, elliptic or ovate or oblong-lanceolate, acuminate, membranous, glabrous, nerves beneath sparsely puberulous; lateral nerves 5-7 on either half; base acute or rounded; petiole 1-2 in. long; stipules subulate, pubescent. *Flowers* small, pentamerous, solitary or in pairs on capillary pubescent pedicels arising from arrested lateral branchlets. *Calyx* glabrous; teeth subulate. *Fruit* bluish-black, slightly compressed, sinuate at the apex; albumen copious.

Garampani, Barpathar SIBSAGAR. Assam species are armed with axillary spines. Not recorded from Assam previously.

Fls. 4. Fr. 11.

4. *Canthium angustifolium* Roxb. =C. Leschenaultii Wight et Arn. Vern. *Dieng-sia*, Khasi.

A scandent shrub armed with decussate usually opposite, axillary or supra-axillary sharp spines, sometimes slightly armed, branches divaricate. *Leaves* 1.3-3 by 4-1.3 in., entire, ovate-lanceolate, acuminate, thinly chartaceous, glabrous and glossy; base rounded; lateral nerves 4-6 on either half. *Flowers* pentamerous, dull white, .5 in. across, in axillary fascicles. *Calyx* turbinate, nearly truncate or with 5 minute teeth. *Corolla* lobes lanceolate, spreading, twisted in bud. *Style* hairy at base; stigma mitriform, bilobed. *Fruit* suborbicular, compressed. *Pyrenes* more or less wrinkled or tubercled, rounded on the back.

N. E. F. TRACT, KHASI HILLS, GARO HILLS.

Flrs. 3. Fr. 8.

5. *Canthium parvifolium* Roxb. Vern. *Sia-soh-ngian*, Khasi.

An erect rigid thorny shrub; stem cinnamon-coloured when young. *Branchlets* hispid-pubescent, long and spreading. *Leaves* 5-1.5 by 4-1.4 in., sessile or sub-sessile, yellowish-green when dry, entire, ovate-elliptic, pubescent, sub-acute, thinly chartaceous; lateral nerves 4-6 on either half, ascending, arcuate; base acute or rounded; stipules ovate-lanceolate. *Flowers* 5-merous, sub-sessile, axillary, in clusters. *Calyx* sinuately 5-toothed; teeth minute. *Corolla* sub-globose, glabrous; lobes lanceolate, acute. *Fruit* globose, 7-9 in. across. *Pyrenes* more or less tubercled, rounded on the back.

KHASI HILLS, GOALPARA.

Flrs. 3-5. Fr. Cold season.

29. VANGUERIA Juss.

Vangueria spinosa Roxb. Vern. *Mainakanta*, Beng.; *Ketkora*, Mon, Ass.; *Thitchkeong*, Garo; *Mon*, Cah.; *Misathei*, Kuki; *Haibi*, Manip.; *Soh-mon*, *Dieng-soh-myren*, Khasi; *Dieng-sa-matan*, Synt.

A deciduous shrub or small tree. *Bark* brown to deep grey with vertical cracks; blaze yellowish. *Spines* up to

·7 in. long, somewhat supra-axillary; branchlets terete. *Leaves* opposite or sometimes ternate, 1·5-5 by 1·2-75 in., entire, ovate-elliptic or elliptic-ovate, acute or bluntly acuminate, membranous, more or less glabrous; lateral nerves 6-9 on either half, curving upwards near the margin; nerve axils with tufts of hairs; base shortly cuneate; petiole ·2-·5 in. long; stipules connate, cuspidate from a broad base. *Flowers* greenish white, on short peduncled cymes, which are axillary or supra-axillary or sometimes from small excrescences. *Calyx* 5-toothed. *Corolla* induplicate-valvate in bud; tube short, sub-globose; throat woolly; lobes spreading. *Stamens* sub-sessile; anthers exserted. *Ovary* 5-celled, less often 3-4-celled or 6-celled; style long; stigma lobed; ovules pendulous, solitary. *Fruit* a fleshy drupe, about 1·1-·5 in. across, yellowish when ripe, with 3-5 woody pyrenes; embryo central in copious fleshy albumen.

GARO HILLS, SIBSAGAR, K. & J. HILLS, N. E. FRONTIER TRACT, KAMRUP, CACHAR, DARRANG and GOALPARA.

Fruits edible. Leaves are sometimes eaten pounded into a paste.

Flrs. 4-5. Fr. Rainy season.

30. IXORA Linn.

Shrubs or small trees. *Leaves* opposite, occasionally ternate, usually coriaceous; stipules interpetiolar, usually connate. *Flowers* usually 4-(rarely 5-) merous in terminal 3-chotomously branched or corymbose cymes; bracts 2, coriaceous. *Calyx* tube ovoid, small; teeth persistent. *Corolla* tube slender, long; lobes usually shorter than the tube, spreading, often reflexed, twisted in bud. *Stamens* on the mouth of the corolla; filaments obsolete or very short; anthers linear, 2-fid at base, often apiculate. *Ovary* 2-celled; style filiform, exserted; stigma slender, 2 branched, fusiform; ovules solitary in each cell, peltately attached to the septum. *Fruit* globose or sub-didymous, with 2 plano-convex or ventrally concave coriaceous pyrenes. *Seeds* often 1 only (others undeveloped); testa membranous; albumen horny; cotyledons flat, thin; radicle inferior.

Calyx-teeth longer than ovary :—

Flowers in compact corymbiform cymes,
usually sessile. Corolla tube slender :—

Lateral nerves conspicuous; petiole
.5-1 in. long. .. .

Lateral nerves slender and obscure;
petiole .2-.6 in. long. .. .

Calyx-teeth as long as or shorter than ovary :—

Flowers in long pedunculate brachiate
cymes; young parts pubescent; corolla
lobes notched. .. .

Flowers in shortly pedunculate (less than
2 in.) cymes :—

Lateral nerves up to 14 pairs; petiole
.2 in. long; corolla lobes oblong. ..

Lateral nerves 12-17 pairs; petiole
.2-.6 in. long; corolla lobes linear
(young parts drying black). ..

Lateral nerves 8-10 pairs; petiole
.2-.3 in. long. .. .

Lateral nerves 24-30 pairs; petiole
.3-.8 in. long. .. .

1. *I. acuminata*.

2. *I. subsessilis*.

3. *I. villosa*.

4. *I. parviflora*.

5. *I. nigricans*.

6. *I. cuneifolia*.

7. *I. undulata*.

1. Ixora acuminata Roxb.

Shrub or an undershrub, branchlets ribbed or angled.
Leaves very variable, 4-15 by 2·5-6 in., elliptic or linear-
elliptic-oblong, acuminate, coriaceous, glabrous; lateral
nerves 9-11 on either half; base usually connate or wedge-
shaped; petiole .5-1 in. long. *Floral* pair of leaves ovate
or obovate, sessile, auricled or with rounded base. *Flowers*
in sessile or sub-sessile corymbose dense flowered cymes;
bracteoles long. *Calyx* glabrous, reddish; teeth lanceolate,
much longer than the ovary. *Corolla* white; tube very
slender, up to 1·5 in. long, narrowly obovate; mouth villous
and pubescent. *Anthers* sessile. *Stigma* fusiform. *Fruit*
ellipsoid, up to .7 in. long.

GOALPARA, SIBSAGAR.

Flrs. 5. Fr. Autumn.

2. Ixora subsessilis Wall. Vern. Deing-jowat, Khasi.

A shrub or an undershrub, handsome when in flower.
Bark greyish brown. *Branchlets* greyish-green. *Leaves* 3-6
by .5-2 in., elliptic-lanceolate, oblanceolate, sharply acuminate,

entire, subcoriaceous, shining, paler when dry; nerves slender and obscure; petiole 2·6 in. long; stipules sheathing, long cuspidate. *Flowers* deep red (gradually getting lighter, even white), in terminal sub-sessile corymbiform cymes. *Peduncles* generally geniculate. *Calyx* bright red; segments linear, 3 or 4 times the ovary. *Corolla* very slender, 1·75-1·25 in. long; lobes 4, lanceolate, reflexed, acute; mouth glabrous. *Filaments* flattened; anthers slender. *Fruit* 1-2-seeded, crowned with the calyx-teeth; pyrene concave.

SIBSÀGAR, CACHAR, MIKIR HILLS, LAKHIMPUR, KHASI & JAINTIA HILLS-ascending up to 4,000 ft.

Flrs. 5. (Sibsagar)-9-10. Fr. 10-12.

3. *Ixora villosa* Roxb.

A shrub. *Branchlets* pubescent or tomentose. *Leaves* very variable, 5-14 by 2-5 in., narrow or broad elliptic, caudate-acuminate, entire, thinly coriaceous, glabrous above, more or less tomentose beneath; lateral nerves 10-12 pairs; base rounded or acute; petiole short; stipules tomentose. *Flowers* white in long peduncled brachiate pubescent cymes. *Calyx-teeth* short, as long as the tube. *Corolla* glabrous; tube very slender; lobes 3-4 in. across, notched. *Filaments* subulate; anthers slender. *Style* exserted. *Fruit* size of a pea, red, crowned by the calyx limb. *Seeds* ventrally concave.

Thariaghât (KHASI HILLS); Golaghat, (SIBSAGAR); CACHAR, Kohima Road, Fort Lungleh (up to 4,000 ft.).

Flrs. 4-6.

4. *Ixora parviflora* Vahl.

A small evergreen glabrous tree or shrub with dark-pale greyish often postulate bark; blaze flesh coloured. *Leaves* sub-sessile, 3-6 by 1·5-2·5 in., elliptic or oblong, obtuse or shortly acuminate, entire, coriaceous, dark-green and shining; lateral nerves up to 14 on either half; base rounded or cordate (Assam specimen cuneate or narrowed to the petiole); petiole up to 2 in. long; stipules cuspidate. *Flowers* white, odorous, sub-sessile, in compact 3-5 branched panicles; buds ellipsoid. *Calyx* lobes minute.

Corolla glabrous; tube 3-4 in.; lobes reflexed, usually 4, sometimes 5. *Anthers* tailed. *Style* slightly hairy. *Fruit* size of a pea, reddish or black when ripe.

KHASI HILLS (Mann).

Flrs. 4-5. Fr. 7-8.

5. *Ixora nigricans* Bl. Vern. *Parsim-phoi*, Kuki.

A large evergreen shrub or a tree; stem greyish-brown. *Leaves* 3-6.5 by 1-2 in. (turning black in drying), lanceolate, oblanceolate, elliptic-lanceolate, acute or shortly acuminate, entire, thinly coriaceous, glabrous; lateral nerves 12-17 on either half, inconspicuous, arched; base acute or cuneate; petiole 2-6 in. long; stipules cuspidate, bristly. *Flowers* white, scented, in sub-sessile or shortly peduncled brachiate cymes with 2 lanceolate foliaceous bracts at the base of the main peduncles; buds narrowly fusiform. *Calyx* glabrous; teeth triangular, acute, shorter than the ovary. *Corolla* slender, glabrous within and without. *Filaments* slender; anthers almost filiform. *Style* glabrous; stigma with recurved branches. *Fruit* size of a pea, black. *Seeds* plano-convex.

KHASI HILLS, NAGA HILLS, N. CACHAR HILLS (5,000 ft.).

Flrs. 4-5. Fr. 10-11.

6. *Ixora cuneifolia* Roxb.

An evergreen shrub. *Leaves* 6-9 by 2-4 in., elliptic-lanceolate or oblanceolate, shortly acuminate, entire, sub-coriaceous, glabrous above, glabrous or minutely puberulous beneath; lateral nerves 8-10 on either half, arched, terminating in intramarginal veins; petiole 2-3 in. long; stipules cuspidate. *Flowers* white, about 1 in. long, sub-sessile, on short peduncled or sub-sessile cyme. *Calyx* glabrous; teeth as long as the tube. *Corolla* tube slender; lobes oblong. *Style* exserted. *Fruit* size of a pea, red (3-4 by 2-05 in.). *Seeds* ventrally concave.

SYLHET (De Silva, Hooker); Duffla Hills (Lister) up to 4,500 ft.

Flrs. 4-7. Fr. Cold season.

7. *Ixora undulata Roxb.*

A large evergreen shrub or small tree (25'/10''); young parts puberulous. Bark grey, rough; inside light brown, turning darker. Leaves 3-8 by 1-2.5 in., elliptic, elliptic-lanceolate or linear-lanceolate, acute or acuminate, mostly with undulate margins, membranous, glabrous, shining; lateral nerves 24-30 on either half, arched; base acute; petiole 3-8 in. long, channelled; stipules broadly marginate with a long cusp. Flowers white, scented, in corymbosely panicled lax peduncled brachiate cymes which are jointed at the ramifications; bracts and bracteoles persistent; buds slender, clavate or lanceolate. Calyx glabrous; segments persistent, acute, minute. Corolla tube slender, up to .5 in. long; lobes about as long or a little shorter, spreading, reflexed, revolute (valvate). Filaments slender; anthers dorsifixated. Stigma recurved. Fruit ellipsoid, succulent, purplish or blackish grey when ripe, with 2 plano-convex pyrenes.

NOWGONG, GOALPARA, KAMRUP, KHASI HILLS.
Wood hard.

Flrs. 4-5. Fr. 8-9.

31. PAVETTA Linn.

Shrubs or small trees. Leaves usually membranous; stipules usually connate in a loose deciduous intrapetiolar sheath. Flowers in terminal or axillary 2-3-chotomously branched corymbose cymes; bracteoles small. Calyx turbinate or campanulate, segments 4, rarely 5. Corolla hypocrateriform; lobes 4, rarely 5, contorted; tube slender, cylindric. Stamens 4, rarely 5, on the mouth of the corolla; anthers linear. Ovary 2-celled; style slender, long, much exserted; stigma fusiform; ovules solitary in each cell attached to the septa on a prominent placenta. Fruit small, baccate, fleshy with 2 ventrally concave pyrenes; testa membranous; albumen horny; embryo curved; cotyledons foliaceous; radicle inferior.

Flowers in spreading corymbose panicles.
Lateral nerves 10-15, glabrous. 1. *P. indica*.

- Flowers in corymbose cymes; branches sessile.
Lateral nerves 10-15, tomentose.
2. *P. naucleiflora*.
Flowers in compact capitate cymes. Lateral
nerves 7-9.
3. *P. subcapitata*.

1. Pavetta indica Linn. Vern. *Dieng-long-tham*,
Dieng-pait-parao, *Dieng-soh-sim*, Khasi; *Kange*, Nep.;
Khamkhathek, Garo; *Gobor-hitha*, *Sam-suku*, Ass.; *Jangiar-long*, Mik.; *Patang-asina*, N.E. F.

A large deciduous spreading shrub or a small tree (up to 18 ft.), greyish, with slightly rough bark. *Leaves* rather variable, 3-7 by 1-3 in., elliptic-ovate or oblanceolate, obtuse, acute or acuminate, subcoriaceous, pubescent or glabrous; lateral nerves 10-15; base tapering; petiole 5-1.5 in. long; stipules with acute tip. *Flowers* white, fragrant, in terminal or lateral corymbose panicles; bracts broad, membranous. *Calyx* usually pubescent, more or less truncate or with 4 short teeth. *Corolla* salver-shaped; tube long, very slender; lobes contorted in bud. *Stamens* 4 on the mouth of the corolla; filaments short; anthers exserted; style filiform, exserted, about 1 in. beyond the mouth of the corolla; stigma not divided. *Fruit* globose, glossy, blackish-green.

NOWGONG, N. E. FRONTIER, GOALPARA, DARRANG,
CACHAR, GARO HILLS, KAMRUP, LAKHIMPUR, N. C. HILLS.

Flrs. 6. Fr. 12-1.

2. Pavetta naucleiflora Wall.

A shrub, all parts densely pubescent. *Leaves* 3-6 by 1-2 in., elliptic, broad-lanceolate or oblanceolate, entire, acuminate, subcoriaceous, more or less tomentose, more so on the nerves beneath; lateral nerves 9-10 on either half; base acute; petioles hairy, 5-1 in. long. *Flowers* white, long pedicellate on sessile corymbose cymes; branches sessile, hairy. *Calyx* tubular, pubescent; teeth subulate, small. *Corolla* white, 25-5 in. long; tube slender; lobes oblong. *Fruit* size of a small pea, black, hispid, 25 in. across.

SYLHET (Wall Cat. 6171), KHASI HILLS, ASSAM.

Flrs. 1. Fr. Hot season.

3. Pavetta subcapitata Hook. f. Vern. *Khem-arkhu*,
Kach.; *Mir-arong*, *Mirchakchu*, *Usupiban*, Mik.

A shrub. Bark brown. Leaves 2·5·5 by ·7·2 in., elliptic-lanceolate or elliptic-obovate, caudate-acuminate, entire, glabrous above, finely pubescent beneath; lateral nerves 7·9 on either half, ascending, arched at the margins; base acute or cuneate; petiole ·3·1 in. long. Flowers white in terminal sessile compact capitate cymes. Calyx puberulous; teeth very short, distinct. Corolla tube 5·75 in. long. Style filiform, much exserted, about 1 in. beyond the mouth of the corolla. Berry rounded, size of a pea.

NOWGONG, SIBSAGAR, KHASI & JAINTIA HILLS (Gomez).
Leaves are eaten.

Fls. 5-6. Fr. Cold season.

32. COFFEA Linn.

Shrubs. Leaves opposite, rarely ternate; stipules free, broad. Flowers in axillary or terminal fascicles or solitary or axillary cymes. Calyx tube short; limb short, often glandular within, persistent. Corolla lobes 4·7, spreading, contorted in bud. Anthers 4·7, sessile, often recurved and twisted. Ovary 2-celled; style filiform, bifid at the apex; lobes linear or subulate; ovules solitary in each cell, peltate on the septum. Drupe with 2 plano-convex or ventrally concave coriaceous or cartilaginous pyrenes. Seeds concave or grooved ventrally; albumen horny; embryo short, subbasal; cotyledons cordate, thin; radicle inferior.

Flowers in many flowered fascicles. Corolla
tube less than ·5 in. long:—

Calyx truncate:—

Glabrous shrub or small tree. . . . 1. *C. arabica*.

Calyx-teeth acute:—

Pubescent rambling or almost climbing shrub. Seeds ventrally concave. . . . 2. *C. khasiana*.

Glabrous rambling or almost climbing shrub. Seeds plano-convex. . . . 3. *C. Jenkinsii*.

Flowers solitary or in few flowered fascicles.

Corolla tube ·5 in. or longer:—

Flowers solitary or 1-3 together. Calyx
truncate, obscurely 5-toothed. 4. *C. bengalensis*.

Flowers usually solitary. Calyx many
toothed. 5. *C. fragrans*.

1. Coffea arabica Linn. Vern. Dieng-koffi, Khasi.

A handsome evergreen shrub or small tree with spreading branchlets. *Leaves* bifarious, 5-7 by 1·2-2·5 in., elliptic to ovate-oblong, shortly acuminate, shining, glabrous; lateral nerves 10-12 on either half, looped and with large gland pits; base narrowed into a short petiole; stipules broadly lanceolate, cuspidate. *Flowers* appearing with the leaves, sub-sessile, 1-3-nate or in axillary cymes subtended by foliaceous bracts. *Calyx* limb truncate. *Corolla* funnel-shaped. *Drupe* purple when ripe, oblong, with 2 pyrenes.

Cultivated in Mahadeo and Dawki (KHASI HILLS).

Yields the well-known coffee beans of commerce.

Flrs. 3. Fr. 12.

2. Coffea khasiana Hk. f. Vern. Nreu-chiang-pui, Naga; Dieng-soh-ja-ryngksang, Synt.; Dieng-supoh-niuroi, Khasi.

A suberect shrub (up to 9 ft. in height) with rough greyish or brown finely furrowed branches; twigs and young parts adpressed pubescent. *Leaves* 4 by 1·5 in., oblong or elliptic-lanceolate, caudate-acuminate, sinuate, glabrous above, prominent beneath; secondary nerves 6-8 on either half; tertiaries fine; petiole short, ·2-·25 in. long, stout, pilose; stipules subulate from a base ·3 in. long. *Flowers* ·25 in. long, in many flowered axillary dense much branched capitulate pubescent cymes; bracts and bracteoles opposite, connate below, triangular ovate; pedicels very small. *Calyx* ·05 in. long; teeth pliose, acute. *Corolla* green in bud, ultimately orange; tube ·2 in. long; throat villous; lobes ·05 in. long, triangular. *Stamens* at the throat of the corolla tube; filaments short. *Ovary* 2-celled with one pendulous ovule in each surmounted by an annular fleshy disk; stigma deeply bifid; lobes linear. *Drupe* globose, ·25 in. across, crowned by the persistent calyx teeth. *Seeds* ventrally concave.

KHASI & JAINTIA HILLS, MANIPUR and GOALPARA.

Flrs. 4-7. Fr. 11-2.

3. Coffea Jenkinsii Hk. f.

A shrub or a tree (up to 30'/35") similar to *C. khasiana* but almost entirely glabrous. Leaves 4-8 by 1-2 in., variable, narrow-lanceolate to elliptic-lanceolate, entire, caudate-acuminate, membranous, glabrous above, more or less pubescent beneath specially on the nerves; lateral nerves prominent, 6-8 on either half, arcuate; base cuneate or acute; petiole 1-3 in. long. Flowers in axillary fascicles; bracts connate into a tube at the base of the ovary. Calyx 2 in. long, broadly campanulate; teeth small, acute. Corolla 4-lobed; tube about 1.6 in. long with tufts of hairs in the sinuses of the lobes. Stamens 4. Fruit ellipsoid, 3 in. long. Seeds plano-convex without the groove.

KHASI HILLS.

Flrs. 3-4. Fr. 7-9.

4. *Coffea bengalensis* Roxb. Vern. *Khum-daude*, Mech.; *Akhaji*, *Dewamali*, *Kothnaphul*, Ass.; *Mirthelo*, *Mirherai*, *Porkanthu*, *Lekluru*, Mik.; *Khemsisa-baphang*, Kach.

A deciduous shrub, with slender spreading branches, and pale greyish-brown bark. Leaves variable, 2-4 by 1-2.5 in., elliptic or broadly ovate, acute or acuminate, entire, membranous, glabrous, except on the nerves beneath, dull green; lateral nerves 10-15 on either half; base narrowed into short petiole; petiole up to 1.5 in. long; stipules persistent, setaceous, stiff. Flowers slender, white, fragrant (appearing with the leaves, occasionally before the appearance of the new leaves), showy, 1-1.8 in. across, solitary or 1-3 together, axillary or at the ends of small branchlets. Calyx truncate; teeth minute. Corolla salver-shaped; tube short, twisted in bud. Anthers dorsifixed, apiculate. Drupe subglobose or ovoid, blackish, sub-didymous. Seeds grooved.

KHASI HILLS, GOALPARA, KAMRUP, NOWGONG, DARRANG, SIBSAGAR, LAKHIMPUR.

The seeds are used as substitute for coffee. Often found flowering all the year round.

Flrs. 2-5. Fr. 10-12.

5. Coffea fragrans Wall. mss.

A deciduous shrub, stem glabrous. *Leaves* 2-4 by 1-2 in., elliptic, elliptic-lanceolate, blunt or rounded; glabrous, pale beneath; lateral nerves conspicuously raised, 4-5 on either half, slender, arched. *Flowers* fragrant, white, sub-solitary, 5-merous, appearing with the leaves. *Calyx* limb many toothed. *Corolla* tube .6-1 in. long. *Drupe* didymous.

SYLHET (Gomez).

33. LEPTODERMIS Wall.

Leptodermis Griffithii Hk. f.

A rigid much branched shrub (8 ft.), foetid when bruised. *Leaves* opposite, several pairs often approximate on arrested branchlets, .3-1.5 by .2-.5 in., elliptic-lanceolate, acute, entire, subcoriaceous, scaberulous above, almost glabrous beneath, but puberulous along the nerves; lateral nerves 2-3 on either half; base narrowed into the petiole; petiole up to .4 in. long; stipules persistent, small. *Flowers* usually 5-merous, white, almost sessile, terminal with a pair of connate acuminate bracts. *Calyx-teeth* nearly glabrous, lanceolate. *Corolla* funnel-shaped, pubescent outside, .6 in. long, densely white, hairy within; lobes valvate with inflexed edges. *Stamens* inserted on the corolla throat; anthers 5, oblong, sub-sessile. *Ovary* 5-celled; style slender, long, with 5 feathery arms; ovules solitary in each cell, basal, erect. *Capsule* 5-valved to the base, .15 in. long, 5 seeded. *Seeds* enveloped in a loose reticulate fibrous covering.

MANIPUR, KHASI HILLS, up to 5,000 ft.

Flrs. 6-7. Fr. Beginning of cold season.

34. PÆDERIA Linn.

Slender twining shrubs, foetid when bruised; branches terete, flexuous; stipules intrapetiolar, triangular, deciduous. *Flowers* 4-5-merous, in axillary and terminal 2-3 cymosely branched panicled cymes. *Calyx* persistent. *Corolla* tubular or funnel-shaped, pubescent; lobes valvate in bud with inflexed crisped margins. *Anthers* sub-sessile on the corolla

tube, linear-oblong. *Ovary* 2-celled; style slender; stigmas 2, capillary twisted; ovules solitary in each cell, basal, erect. *Fruit* compressed or globose; epicarp thin, fragile, shining, separating from 2 orbicular or oblong dorsally compressed membranous or coriaceous pyrenes. *Seeds* much compressed dorsally; testa adnate to the pyrene; cotyledons large, foliaceous, thin.

- Fruit much compressed; pyrenes separating from a filiform carpophore. Ripe seeds broadly winged. 1. *P. foetida*.
 Fruit subglobose; pyrenes not separating from a filiform carpophore. Ripe seeds not winged. 2. *P. tomentosa*.

1. Pæderia foetida Linn. Vern. *Makunda-lot*, Sylh.; *Paduri-lata*, *Padri-lewa*, Ass.; *Madot-thi*, *Pashum*, Garo; *Doukhi-Bondung*, Mech; *Sam-khi-phu*, Kach; *wei-nam-brang*, Kuki; *Mei-in-tung*, *Mei-soh-masem*. Khasi.

A slender wiry foetid climber, winding anti-clock-wise. *Leaves* opposite, 2·5·5 by ·6·2·5 in., elliptic-ovate, oblong-ovate or lanceolate, shortly acuminate, entire, membranous, glabrous; lateral nerves 5-7 on either half; nerve axils often hairy; base rounded or sub-cordate; petiole 1·3 in. long. *Flowers* greyish purple, with reddish purple mouth, in axillary and terminal cymose panicles; cyme branches opposite. *Calyx* teeth small, usually triangular. *Corolla* funnel-shaped; tube glandular hairy within. *Fruit* ellipsoid, reddish, compressed; pyrenes with a broad wing.

N. E. FRONTIER, N. C. HILLS, CACHAR, SYLHET, NOWGONG, DARRANG, KAMRUP, GOALPARA, GARO HILLS, KHASI HILLS.

The decoction prepared from the leaves is considered wholesome and nutritive. The whole plant is regarded as a specific for rheumatic affections. The juice of the leaves is astringent and is a specific for diarrhoea and dysentery.

Fls. 7-10. Fr. Cold season.

2. Pæderia tomentosa Bl. Vern. *Bud-in-tung*, Khasi; *Buking-bepuk*, Miri; *Doukhi-bondung*, Mech; *Oasibu*, Mik.

A slender climber. *Leaves* opposite, ·2·4·5 by 1·2·5 in., ovate to ovate-lanceolate, acute or acuminate, entire, membranous; usually glabrous, sparsely pubescent or

subtomentose; base usually subcordate; petiole 5-2·5 in. long. *Panicles* often scorpoid. *Calyx* small. *Corolla* scurfy-tomentose or velvety. *Fruit* subglobose, ripening yellowish-brown; pyrenes 2, orbicular, much compressed.

N.-E. FRONTIER TRACT, DARRANG, SIBSAGAR, KAMRUP, GOALPARA, KHASI HILLS, up to 6,000 ft.

Flrs. 7. Fr. Cold season.

Pæderia Cruddasiana Prain.

A climber. Leaves 2-5 by 1-2·5 in., opposite, ovate, acute; base truncate. Petiole 1-1·25 poll long. Flowers in axillary or terminal paniculate cymes; bracteoles subulate. Calyx segments 5, short, triangular; tube campanulate. Corolla puberulous outside, densely tomentose inside. Fruit 2·5 by 3 in., egg-shaped, uncompressed, narrowed upwards from the middle.

LUSHAI HILLS, GARO HILLS.

35. MORINDA Linn.

Erect or climbing shrubs or trees. Leaves opposite, rarely ternate; stipules connate, sheathing. Flowers white, axillary or terminal in simple or panicled or umbellate peduncled heads; the calyces more or less connate. Calyx-tube short; limb truncate, obscurely toothed. Corolla lobes 4-7, coriaceous valvate. Stamens 4-7; filaments short; anthers linear and oblong. Ovary 2 or sometimes spuriously 4-celled; style slender with 2 stigmatic lobes; ovules solitary, ascending from a sub-basal placenta on the septum. Fruit a syncarpium formed by the succulent enlarged calyces enclosing many 1-seeded pyrenes, sometimes cohering in a 2-4-celled putamen or occasionally nearly free drupels. Seeds obovoid or reniform; testa membranous; albumen fleshy or horny; radicle inferior.

Corolla 5-7-merous, tube up to 1 in. long.
Leaves 4-15 in. long.

1. *M. angustifolia*.

Corolla 4- (rarely 5-) merous; tube less than 5 in. long :—

Diffuse climbing shrub; branches usually glabrous. Syncarpium irregularly lobed, 25 in. across.

2. *M. umbellata*.

Climbing shrub, more or less hirsute. Syncarpium deep orange, 8 in. across. . .

3. *M. villosa*.

1. **Morinda angustifolia** Roxb. Vern. *Dieg-nong*, *Dieng-siroi*, *Dieng-shongrei*, Khasi; *Asu-goch*, *Asu*, *Akalphih*, Ass.; *Changmi-rongbi*, Duff.; *Kechan-bophang*, *Cheng-long-phang*, *Jeng-long-phang*, Kach.; *Jang-tarlong*, *Tarlong-arong*, Mik.; *Ralum*, Tipp.; *Holdiruk*, Sylh.; *Asou*, *Asou-biphang*, Mech.; *Chhennong*, *Chhengrong*, Garo; *Asu*, Jharna.

A large shrub (18'/12'') or a small tree. Bark greyish, exfoliating in thin pieces; blaze whitish. Leaves 4-15 by 1·5-5·5 in. long, narrow-lanceolate or oblanceolate, entire, long acuminate, membranous, more or less puberulous, but upper surface glabrescent with age; hairs branched on the nerves beneath; lateral nerves 10-15 on either half, looped within the margin; tertiaries prominent, oblique; petiole 2-1·5 in. long; stipules acute. Flowers fragrant, usually 5-merous, in axillary on leaf opposed pedunculate globose heads, ultimately elongating in fruit. Calyx nearly truncate or obscurely toothed. Corolla salver-shaped; tube up to 1 in. long. Fruit turbinate, not confluent, almost white, structure of the pyrene is characteristic.

SYLHET, KAMRUP, GOALPARA, GARO HILLS, SIBSAGAR, LAKHIMPUR, DARRANG and KHASI & JAINTIA HILLS, ascending up to 4,000 ft.

The root is used for dyeing.

Flrs. 1-5. Fr. 6-9.

2. **Morinda umbellata** Linn.

A diffuse shrub with long switchy climbing branchlets; internodes of young shoots long. Leaves variable, 2·5-5·5 by 1·8-2 in., elliptic, oblong or lanceolate, sometimes obovate, acuminate, entire, membranous, usually glabrous; lateral nerves 6-8 on either half; base acute; petiole 3-5 in. long; stipules sheathing. Flowers heads in terminal umbels. Peduncles sparingly pubescent. Calyx limb a mere rim only, truncate. Corolla tube short, hairy within. Syncarpium irregularly lobed, 25 in. across; pyrenes pyriform. Seeds not winged.

KHASI HILLS (up to 4,000 ft.).

Flrs. 9. Fr. 10-11.

3. *Morinda villosa* Hk. f.

A climbing shrub. Branches more or less hirsute, longitudinally ribbed. Leaves 1·5-4 by 1·1-3 in., elliptic-obovate or elliptic-lanceolate, acuminate, entire, membranous, pubescent above, hirsute beneath, pale greenish when dry; lateral nerves prominent, 10-15 on either half; base narrowed into the petiole. Flowers usually 4-5-merous in terminal long pedunculate umbels. Corolla short. Drupes confluent. Syncarpium deep orange, ·8 in across.

KHASI HILLS, CACHAR.

Fls. 4-5. Fr. 9-10.

36. *DAMNACANTHUS* Gærtn.

Damnacanthus indicus Gærtn.

A small rigid spinous shrub or undershrub with spreading braches; stem pubescent. Spines stipulary, ·5-1·3 in. long, slender, sharp, brown. Leaves ·5-1·8 by ·4-·8 in., sub-sessile, ovate, sharply acute, entire, glabrous, rounded at the base; lateral nerves about 3 on either half, obscure. Flowers 4-5-merous, bracteate, white, about ·1 in. long, axillary, solitary or in pairs. Calyx-tube conical, ribbed; teeth triangular. Corolla funnel-shaped; throat bearded; lobes triangular-ovate, valvate in bud. Stamens on throat of corolla; filaments short; anthers exserted, connective broad. Ovary 2-4-celled; style filiform; stigma cleft; ovules solitary in each cell. Drupe globose, size of a small pea with 1-2 (?) plano-convex pyrenes; albumen copious, horny.

MISHMI HILLS, KHASI HILLS (Mawphlong—U. Kanjilal). Alt. 6,000 ft.

Fr. 9.

37. PRISMATOMERIS Thwaites.

Prismatomeris albidiiflora Thw. Vern. *Dieng-soh-sri*, Kh.; *Khabanpelie*, Lushai; *Ramkha*, Tipp.; *Khemdoudi*, *Ram-mali*, Kuki; *Jangtarlong*, Mik.

A large evergreen shrub (10'/15'') with tetragonal compound divaricating branchlets. Bark yellowish grey; blaze white. Leaves 2-5 by ·7-2 in., lanceolate to elliptic-

lanceolate, entire, acuminate, coriaceous; lateral nerves slender, 6-9 on either half; base narrowed into the petiole; petiole 2-5 in. long; stipules cuspidate. *Flowers* 4-5-merous, whitish, fragrant, unisexual, in axillary fasciculate cymes, occasionally in pedunculate umbels supported by leaf like bracts; pedicels long, filiform. *Calyx* cup-shaped, almost truncate; teeth very small. *Corolla* tube 1 in long, cylindric; lobes 3 in., valvate in bud, pubescent; throat minutely pubescent. *Stamens* on the throat of the corolla tube; filaments short; anthers linear, included. *Ovary* 2-celled; ovules solitary, pendulous; style linear; stigma 2-cleft. *Fruit* globose, .25 in. across, purplish black when ripe, 1-2-celled, 1-2-seeded. *Seeds* ventrally excavated; testa membranous; embryo lateral; albumen horny; cotyledons reinform; radicle inferior.

SIBSAGAR, GOALPARA, NOWGONG, N. C. HILLS, SYLHET, LUSHAI HILLS, KHASI HILLS, ascending up to 4,000 ft.

Wood cream coloured. Juice of leaves is used for stomach ache.

Flrs. 5. Fr. 10-1.

38. PSYCHOTRIA Linn.

Shrubs or small trees, rarely herbs, erect or occasionally climbing. *Leaves* opposite, rarely whorled; nerve axils often pitted; stipules intra-petiolar, sometimes connate, often with axillary glandular hairs. *Flowers* in terminal cymes, heads or fascicles (rarely axillary). *Calyx-teeth* short; limb deciduous or persistent. *Corolla-tube* short, straight; throat usually hairy; lobes 5, rarely 4 or 6, valvate in bud. *Stamens* equalling corolla lobes, inserted at the mouth or throat of the corolla; anthers oblong or linear, included or exserted. *Ovary* 2-celled; ovules solitary in each cell, basal, erect, anatropous; style short with 2 branched stigma. *Fruit* a drupe with 2 plano-convex pyrenes, smooth or furrowed; each 1-seeded. *Seeds* plano-convex, ventrally flat or grooved; testa thin; albumen hard, sometimes ruminant; embryo small; cotyledons leafy; radicle inferior.

Pyrenes plano-convex, no dorsal ridges, no ventral groove. Cyme-branches opposite. .. 1. *P. adenophylla*.
Pyrenes plano-convex, dorsal ridges absent or obscure with frequently a T-shaped ventral groove :—

Intramarginal nerves conspicuous :—	
Calyx-teeth linear, ciliate :—	
Cymes small, axillary or terminal, short peduncled.	2. <i>P. calocarpa.</i>
Calyx-teeth short, triangular :—	
Cymes trichotomous, long pedun- cled, terminal.	3. <i>P. Thomsonii.</i>
Intramarginal nerves not conspicuous :—	
Cymes long peduncled, corymbiform :—	
Calyx obscure. Corolla throat villous.	4. <i>P. denticulata.</i>
Calyx obconic. Corolla throat bearded with long stiff hairs. . .	5. <i>P. silhetensis.</i>
Cymes sessile or short peduncled, sub- corymbiform :—	
Corolla 1 in. long. Fruit red, ·25 in across.	6. <i>P. montana.</i>
Pyrenes with 4 sharp dorsal ridges :—	
Leaves membranous; lateral nerves 10-14.	7. <i>P. erratica.</i>
Leaves chartaceous; lateral nerves 14-18.	8. <i>P. fulva.</i>
Pyrenes with 1 sharp dorsal ridge. Calyx- teeth obscure.	9. <i>P. symplocifolia.</i>

I. Psychotria adenophylla Wall. Vern. *Dieng-lathyllong-khlo*, *Dieng-mynro-saliang*, Synt.

An evergreen glabrous shrub. Leaves turning yellowish when dry, 3-6 by 1-2 in., elliptic, elliptic-lanceolate or obovate-oblong, entire, coriaceous, bluntly acuminate, glabrous; lateral nerves 12-16 on either half, pale yellow, prominent on lower surface with granular pits at the axils; petiole ·2-·3 in. long; stipules at base of inflorescence almost tubular, truncate. Flowers small, whitish, pedicellate or sub-sessile, in usually terminal pedunculate racimiform elongate cymes; branches of inflorescence opposite, short; bracts caducous. Calyx almost truncate; teeth obscure. Corolla lobes valvate in bud; throat bearded with a dense fringe of white hairs arching over the ovary. Fruit ovoid, ·25-·3 in. across, purplish black when ripe; pyrenes plano-convex; albumen ruminated.

N. C. HILLS, K. & J. HILLS, ascending up to 4,000 ft.

Flrs. 5. Fr. 10-11.

2. Psychotria calocarpa Kurz.=P. Viridiflora Reinw.

An evergreen semi-herbaceous undershrub (about 6 ft. high); young parts puberulous. *Leaves* variable, 4-10 by 1·5-4 in., elliptic-lanceolate, obovate or ovate-oblong usually entire acuminate, thinly coriaceous, ultimately glabrate above, puberulous beneath with cristate hairs; lateral nerves 11-13 on either half, prominent, arcuate at the margin, subparallel; base narrowed into the petiole; petiole 1·5-1·5 in. long; stipules 2 cleft, caducous, hyaline. *Flowers* whitish-yellowish, in axillary terminal peduncled umbellate cymes. *Calyx* teeth 4, ciliate. *Corolla* white; throat villous; tube short. *Fruit* yellow when ripe, ultimately turning red; pyrenes obscurely 4 ribbed dorsally.

SIBSAGAR, CACHAR, N.E. F. TRACT, NAGA HILLS, LUSHAI HILLS, KHASI HILLS, ascending to 4,000 ft.

Fls. 5. Fr. 10-12.

2. Psychotria Thomsonii Hk. f.

A small evergreen semi-herbaceous bush; stem whitish. *Leaves* 4-6 in. long, narrow-elliptic, serrulate, acuminate, subcoriaceous, glabrous but pubescent along midrib; lateral nerves strong, joined by a prominent intermarginal vein; base cuneate; petiole 3-6 in. long; stipules 4-6 in. long, ovate, membranous. *Inflorescence* terminal. *Fruit* ellipsoid, pointed at both ends, 5 by 2 in.

KHASI HILLS, NAGA HILLS, ascending up to 5,500 ft.

Fr. 9-10.

4. Psychotria denticulata Wall.

A shrub up to 8 ft. high with thick subherbaceous branchlets. *Leaves* 4-9 by 3-5 in., slate coloured when dry, broadly elliptic, obovate or oblanceolate, shortly acuminate, entire, coriaceous, glabrescent above, more or less puberulous beneath; main lateral nerves about 15 on either half, arcuate; intramarginal veins faint; pits on the nerve axils minute or absent; base attenuate; petiole 5-1 in. long; stipules large, membranous, broad with 2 cuspidate tips. *Flowers* greenish, in long peduncled terminal or axillary pubescent corymbiform cymes; peduncle 2-6 in. long, gene-

rally flattened. *Calyx* teeth obscure. *Corolla* tubular; tips of lobes incurved, slightly imbricate in bud; throat villous. *Fruit* globose (·2 in. across), size of a small pea; pyrenes plano-convex, smooth.

KAMRUP, KHASI HILLS.

Flrs. 5-9. Fr. 12-1.

5. *Psychotria silhetensis* Hk. f. Vern. *Soh-um*, Khasi.

A shrub with short branches. *Leaves* 4-10 by 4-6 in., elliptic, oblong-elliptic, entire, shortly acuminate, coriaceous with a velvety sheen above, glabrate or sparingly puberulous beneath; lateral nerves prominent, sub-parallel, 14-18 on either half; base cuneate, terminating in a stout petiole; petiole ·5-1-25 in. long. *Flowers* in axillary or terminal pedunculate more or less pubescent cymes. *Calyx* obconic. *Corolla* tube short, throat bearded with erect hairs. *Fruit* globose or ellipsoid, ·3-·5 in. across; pyrenes with a deep T-shaped ventral groove on back; albumen uniform.

LAKHIMPUR, SIBSAGAR, KHASI HILLS, ascending up to 4,000 ft.

Flrs. 4. Fr. 11-1.

6. *Psychotria montana* Bl.

A small evergreen glabrous shrub. *Leaves* 3-8 by 1-3 in., elliptic or oblong-lanceolate, acuminate, membranous, glabrous; lateral nerves slender, 7-9 on either half, arcuate; base tapering in a slender petiole ·5-1-5 in. long. *Flowers* whitish, in terminal or axillary subcorymbiform cymes. *Calyx* obscurely toothed. *Corolla* tube elongate; throat bearded. *Fruit* ovoid-oblong, ·3-·5 in. long, red; pyrenes plano-convex, scarcely ridged on the back; albumen uniform.

GOALPARA to SADIYA, SYLHET, SIBSAGAR, KHASI HILLS, ascending up to 2,500 ft.

Flrs. 5. Fr. 2.

7. *Psychotria erratica* Hk. f. Vern. *Thingpispu*, *Jogwansoh-arong*, *Chehogwai-arong*, Mik.

An evergreen erect shrub. *Bark* greyish, smooth, thin; blaze light red. *Leaves* 2-5-7-5 by 1-2-5 in., lanceolate,

elliptic-lanceolate, entire, acuminate, membranous, glabrous; lateral nerves slender, 10-14 on either half; base narrowed into the petiole; petiole 3-7 in. long; stipules usually 2-cleft, recurved. *Flowers* in sessile, terminal or axillary cymes, trichotomously branched; bracts lanceolate. *Calyx* teeth longer than the tube. *Corolla* tube short, hairy within. *Fruit* succulent, up to 25 in. across, globose, reddish-yellow; pyrenes with 4 dorsal ridges. *Seeds* undulated.

SIBSAGAR, LAKHIMPUR, N. C. HILLS, KHASI HILLS, ascending up to 5,000 ft.

Flrs. 4-6. Fr. 11-1.

8. *Psychotria fulva* Ham. Vern. *Ja-lai*, Khasi.

A shrub or an undershrub, lower part of stem grey, upper green. *Leaves* decussate, 4.5-10.5 by 2.5-5 in., soft, elliptic, ovate, oblong or obovate, oblanceolate, acuminate, entire, chartaceous, glabrous, somewhat glabrescent beneath; lateral nerves 14-18, subparallel, prominent below, petiole 3-1 in. long, stipules bifid. *Flowers* in axillary or subterminal compact usually peduncled capitate cymes: *Calyx* teeth persistent, lanceolate. *Corolla* tube short; throat villous. *Fruit* elongate, ellipsoid or ovoid, yellow when ripening and then turning tan-red; pyrenes dorsally 4-ridged.

CACHAR, MANIPUR, KHASI^{*} HILLS ascending up to 4,000 ft.

Flrs. 1. Fr. 12.

9. *Psychotria symplocifolia* Kurz.

An evergreen shrub 3-10 ft.; stem grey. *Leaves* turning yellowish when dry, 2.5 by 5.1-5 in., elliptic, lanceolate or elliptic-obovate, entire, caudate-acuminate, coriaceous, glabrous, somewhat glaucous; lateral nerves 10 on either half, rather slender, gland pitted, mainly at the axils of the nerves; petiole 1.4 in. long; stipules obovate, .25 in. long, with a long slender and subulate tip. *Flowers* in terminal (rarely axillary) peduncled trichotomous cymes; branches slender, 1.5-2.25 in. long. *Calyx* teeth obscure. *Corolla* tube short; throat villous. *Fruit* black when ripe,

4-gonous when dry; pyrenes plano-convex with one sharp dorsal ridge; albumen uniform.

KHASI & JAINTIA HILLS, ascending up to 6,000 ft.

Flrs. probably rainy season. (?) Fr. 10-12.

Psychotria subintegra Hk. f.=*Grumilea subintegra* W. & A. 432. A large shrub, glabrous. Leaves 4-6 by 1·5-2 in., elliptic-lanceolate, bluntly acute or obtuse, membranous, glabrous; lateral nerves 6-8 on either half; base acute; petiole 1-1·5 in. long; stipules broad, caducous. Flowers in pedunculate corymbiform cymes; lower pair of cyme branches long-spreading; flowers capitate in ultimate branches. Calyx-teeth short. Corolla-tube funnel-shaped; mouth villous. Fruit globose, smooth, ·2 in. across.

LAKHIMPUR (Jeypore).

Flrs. Hot season. Fr. 7.

39. CHASALIA Comms.

Shrubs or small trees. Leaves usually membranous and glabrous; stipules bld. Flowers in terminal cymes; bracts and bracteoles small. Flowers small, white or pinkish. Calyx small, campanulate; tube ovoid or sub-globose; teeth 5, short. Corolla long, tubular, slender, usually curved; lobes 5, short. Stamens 5, subsessile in the corolla tube. Disc large. Ovary 2-celled; ovule 1 in each cell, erect; style bifid. Fruit dry or slightly fleshy, of 2 ventrally grooved pyrenes. Seeds orbicular, ventrally concave; testa membranous; albumen horny; cotyledons broad; radicle inferior.

Corolla 1 in. long; petiole ·5-1·3 in. Fruit ·5 in. across.	1. <i>C. ambigua</i> .
Corolla ·7 in. long; petiole ·4-·9 in. Fruit ·2 in. across.	2. <i>C. sp.</i>

1. Chasalia ambigua W et A=**Chasalia curviflora** Thw. Vern. *Lamlopinemtu*, Mik.; *Titahukuta*, Ass.

A shrub (up to 8 ft. high); young part succulent or subherbaceous. Bark grey, thin, smooth; blaze white. Leaves variable, 5-11 in., elliptic-obovate or oblanceolate, shortly acute or acuminate, occasionally caudate-acuminate, with obscurely recurved margins, membranous, glabrous;

lateral nerves 7-11 on either half, subparallel, arcuate at the margin; tertiaries obscure; base narrowed into the petiole; petiole 5-1.3 in. long; stipules variable, usually bifid. *Flowers* white, tipped pinkish, in trichotomously branched peduncled cymes, dimorphic, (anthers exserted; stigma included or the reverse). *Calyx* minute, blackish. *Corolla* 1 in. long; tube slender, curved, white with a dash of pink at the extremity of the lobes; throat yellow, hairy inside; disc prominent. *Fruit* .5 in. across, subglobose, more or less didymous, purplish black; pyrenes dorsally compressed.

SIBSAGAR, GOALPARA, NOWGONG, DARRANG, LAKHIMPUR, KHASI HILLS, ascending up to 5,000 ft.

Flrs. 4-5. Fr. Cold season.

2. Chasalia *sp novo* ?

A shrub about 18 ft. high. *Leaves* 4-8 by 1.5-4 in., elliptic or broadly obovate, entire, abruptly acuminate, rather membranous, glabrous; lateral nerves 6-10 on either half, arcuate; base narrowed into the petiole or cuneate; petiole 4-9 in. long. *Flowers* more or less pinkish, in terminal short branched cymes. *Calyx* small; teeth ovate-acute. *Corolla-tube* .7 in. long. *Fruit* globose, blackish, .2 in. across.

SIBSAGAR, NAGA HILLS, KHASI HILLS, ascending up to 4,000 ft.

Flrs. 5-6. Fr. Rainy season.

The above is described from sheets marked *C. assamica* in the herbarium of the Royal Botanic Garden, Sibpur. It appears to be a variety of *C. ambigua* *W. et A.*

Chasalia Iushaiensis Fischer. Vern. Ampangtham, Garo.

A small tree; branches round, fistulous. *Leaves* 4.8-12 by 1.2-2.8 in., opposite, elliptic-lanceolate or falcate-acuminate, membranous, glabrous; nerves prominent; lateral nerves 20 on either half, obscure above, prominent below; attenuate at base; petiole 2-1 in. long; stipules conjoint, caducous. *Cymes* densely flowered, pendunculate, glabrous, in terminal panicles; bracts cuspidate, ovate, 2.8 in. long, bracteole clavate or ciliate; buds narrow clavate, 5 costate, upto .4 in. long. *Calyx* cupular; segments 5, triangular, acute, whitish red at the apex. *Stamens* 5, inserted in the middle of corolla tube; filaments short, subulate; anthers linear, bilobed at base, dorsifixed. *Ovary*

truncate, conical, apex concave, 2-locular; style filiform; stigma 2, elongate, subulate. *Fruit* sub-globose, more or less didymous, smooth, black.

LUSHAI HILLS 200 ft. (Mrs. Parry 180). GARO HILLS, 4,000 ft. (Mrs. Parry 790, 792).

The original name was *Gærtnaria lushaiensis*—Fischer (Loganiaceæ) but now transferred to Rubiaceæ and as *C. lushaiensis*—Fischer (Kew Bull., 1932).

Fr. 10.

40. SAPROSMA Blume.

Saprosma ternatum Hk. f. Vern. *Bhedeli*, Ass.; *Thing-we-namjai*, Kuki; *Thaibreng-jola*, Kach.; *Dieng-so-eit-nai*, Khasi.

An evergreen shrub or small tree (26'/6"), all parts glabrous, branchlets angled. Bark greyish-brown having minute vertical fissures, .25 in. thick, brown below the cuticle; blaze cream colour. Leaves usually ternately whorled, with foetid smell, coriaceous, glabrous on both surfaces, sparingly scaberulous beneath on the nerves and occasionally on the midrib; lateral nerves 7-8 on either half.